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ADAPTATION IN PATHOLOGICAL PROCESSES.<sup>1</sup>

BY WILLIAM H. WELCH, M.D.,  
PROFESSOR OF PATHOLOGY, JOHNS HOPKINS UNIVERSITY.

GRATEFUL as I am for the personal good-will manifested by my selection as President of this Congress, I interpret this great and unexpected honor as an expression of your desire to give conspicuous recognition to those branches of medical science not directly concerned with professional practice, and as such I acknowledge it with sincere thanks.

All departments represented in this Congress are working together toward the solution of those great problems—the causes and the nature, the prevention and the cure, of disease—which have always been and must continue to be the ultimate objects of investigation in medicine. It is this unity of purpose which gives to the history of medicine, from its oldest records to the present time, a continuity of interest and of development not possessed in equal degree by any other department of knowledge. It is this same unity of purpose which joins together into a single, effective organism the component groups of this Congress, representing, as they do, that principle of specialization and subdivision of labor which, notwithstanding its perils, has been the great factor in medical progress in modern times.

Medical science is advanced not only by those who labor at the bedside, but also by those who in the laboratory devote themselves to the study of the structure and functions of the body in health and disease. It is one of the most gratifying results of the rapid advance in medical

<sup>1</sup> Address of the President before the Fourth Congress of American Physicians and Surgeons, held in Washington, May 4-6, 1897.

education in this country during the last few years that successful workers in the laboratory may now expect some of those substantial rewards which formerly were to be looked for almost exclusively in the fields of practical medicine and surgery. We already have abundant assurance that the steady improvement in opportunities and recompense and other material conditions essential for the prosecution of scientific work in medicine will enable this country to contribute to the progress of the medical sciences a share commensurate with its great resources and development in civilization.

The subject of "Adaptation in Pathological Processes," which I have selected for my address on this occasion, is one which possesses the broadest biological, as well as medical, interests. It is this breadth of scientific and practical interest that must justify my choice of a theme which involves many technical considerations and many problems among the most obscure and unsettled in the whole range of biology and of medicine.

I shall employ the epithet "adaptive" to describe morbid processes which bring about some sort of adjustment to changed conditions due to injury or disease. In view of the more technical and restricted meaning sometimes attached to the term "adaptation" in biology, objection may be made to this broad and general application of the word in pathology; but no more suitable and convenient epithet than "adaptive" has occurred to me to designate the entire group of pathological processes whose results tend to the restoration or compensation of damaged structure or function, or to the direct destruction or neutralization of injurious agents. Processes which may be described variously as compensatory, regenerative, self-regulatory, protective, healing, are thus included under adaptive pathological processes. These processes are, in general, more or less advantageous or useful to the individual; but for reasons which will be stated later the conception of pathological adaptation and that of advantage to the individual are not wholly coextensive.

Within the limits of an address I cannot hope to do more than direct attention to some of those aspects of the subject which seem to me to be of special significance. Although most striking examples of adaptation are to be sought in comparative and vegetable pathology, what I shall have to say will relate mostly to human pathology. My purpose is not to point out the beauties or the extent of adaptations in pathological processes, but rather to say something concerning the general mechanism of their production and the proper attitude of mind regarding them, and to illustrate the general principles involved by a few representative examples.

It has been contended that the conception of adaptation has no place in scientific inquiry; that we are justified in asking only by what means

a natural phenomenon is brought about, and not what is its meaning or purpose; in other words, that the only question open to scientific investigation is *How?* and never *Why?* I hope to make clear by what follows in what light I regard this question, and in this connection I shall simply quote Lotze, who, beginning as a pathologist, became a great philosopher: "Every natural phenomenon may be investigated not only with reference to the mathematical grounds of its possibility and the causes of its occurrence, but also as regards the meaning or idea which it represents in the world of phenomena."

The most wonderful and characteristic attribute of living organisms is their active adaptation to external and internal conditions in such a way as tends to the welfare of the individual or of the species. Of the countless physiological examples which might be cited to illustrate this principle, I select, almost at random, the preservation of the normal temperature of the body in warm-blooded animals under varying external temperatures and varying internal production of heat, the regulation of respiration according to the need of the tissues for oxygen, the influence of the load upon the work performed by muscles, the accommodation of the heart to the work demanded of it, the response of glands to increased functional stimulation, the adjustment of the iris to varying degrees of illumination, the influence of varying static conditions upon the internal architecture of bone.

The most striking characteristic of these countless adaptations is their apparent purposefulness. Even if it be true, as has been said by Lange, that "the formal purposefulness of the world is nothing else than its adaptation to our understanding," it is none the less true that the human mind is so constituted as to desire and seek an explanation of the adaptations which it finds everywhere in organic nature. From the days of Empedocles and of Aristotle up to the present time there have been two leading theories to explain the apparent purposefulness of organic nature—the one, the teleological, and the other, the mechanical theory. The teleological theory, in its traditional signification, implies something in the nature of an intelligence working for a predetermined end. So far as the existing order of nature is concerned, the mechanical theory is the only one open to scientific investigation, and it forms the working hypothesis of most biologists. This theory, in its modern form, seeks an explanation of the adaptations of living beings in factors concerned in organic evolution. What these factors are we know only in part. Those which are most generally recognized as operative are variation, natural selection, and heredity. That additional factors, at present little understood, are concerned seems highly probable. The acceptance of the explanation of physiological adaptations furnished by the doctrine of organic evolution helps us, I believe, in the study of pathological adaptations.

As the word "teleology" has come to have, in the minds of many, so bad a repute in the biological sciences, and as I desire, without entering into any elaborate discussion of the subtle questions here involved, to avoid misconceptions in discussing subjects whose ultimate explanation is at present beyond our ken, I shall here briefly state my opinion that all of those vital manifestations to which are applied such epithets as adaptive, regulatory, regenerative, compensatory, protective, are the necessary results of the action of forms of energy upon living matter. The final result, however useful and purposeful it may be, in no way directly influences the chain of events which leads to its production, and, therefore, the character of the result affords no explanation whatever of the mechanism by which the end, whether it appear purposeful or not, has been accomplished. In every case the ultimate aim of inquiry is a mechanical explanation of the process in question. Notwithstanding valuable contributions, especially within recent years, toward such mechanical explanations, we are still far removed from the attainment of this aim.

The knowledge of the fact that the living body is possessed of means calculated to counteract the effects of injurious agencies which threaten or actually damage its integrity must have existed as long as the knowledge of injury and disease, for the most casual observation teaches that wounds are repaired and diseases are recovered from. It is no part of my present purpose to trace the history of the numerous speculations or even of the development of our exact knowledge concerning the subjects here under consideration. I cannot refrain, however, from merely referring to the important rôle which the conception of disease as in some way conservative or combative in the presence of harmful influences has played from ancient times to the present in the history of medical doctrines. Whole systems of medicine have been founded upon this conception, clothed in varying garb. There is nothing new even in the image, so popular nowadays, representing certain morbid processes as a struggle on the part of forces within the body against the attacks of harmful agents from the outer world. Indeed, Stahl's whole conception of disease was that it represented such a struggle between the anima and noxious agents. What lends especial interest to these theories is that then, as now, they profoundly influenced medical practice and were the origin of such well-known expressions as *vis medicatrix naturæ* and *medicus est minister naturæ*.

It is needless to say that there could be no exact knowledge of the extent of operation or of the nature of processes which restore or compensate damaged structures and functions of the body or combat injurious agents, before accurate information was gained of the organization and workings of the body in health and in disease. Although the way was opened by Harvey's discovery of the circulation of the blood, most of our precise knowledge of these subjects has been obtained during the

present century, through clinical observations and pathological and biological studies. In the domain of infectious diseases wonderful and hitherto undreamed of protective agencies have been revealed by modern bacteriological discoveries. Here, as elsewhere in medicine, the experimental method has been an indispensable instrument for discoveries of the highest importance and for the comprehension of otherwise inexplicable facts. Very interesting and suggestive results, shedding light upon many of the deeper problems concerning the nature and power of response of living organisms to changed conditions have been obtained in those new fields of experimental research called by Roux the mechanics of development of organisms, and also in part designated physiological or experimental morphology. Although we seem to be as far removed as ever from the solution of the most fundamental problem in biology, the origin of the power of living beings to adjust themselves actively to internal and external relations, we have learned something from these investigations as to the parts played respectively by the inherited organization of cells and by changes of internal and external environment in the processes of development, growth, and regeneration.

In physiological adaptations, such as those which have been mentioned, the cells respond to changed conditions to meet which they are especially fitted by innate properties, determined, we must believe, in large part by evolutionary factors. In considering pathological adaptations the question at once suggests itself whether the cells possess any similar peculiar fitness to meet the morbid changes concerned; whether, in other words, we may suppose that evolutionary factors have operated in any direct way to secure for the cells of the body properties especially suited to meet pathological emergencies. Can we recognize in adaptive pathological processes any manifestations of cellular properties which we may not suppose the cells to possess for physiological uses? This question appears to me to be of considerable interest. I believe that it can be shown that most pathological adaptations have their foundation in physiological processes or mechanisms. In the case of some of these adaptations, however, we have not sufficiently clear insight into the real nature of the pathological process nor into all of the physiological properties of the cells concerned to enable us to give a positive answer to the question.

While we must believe that variation and natural selection combined with heredity have been important factors in the development and maintenance of adjustments to normal conditions of environment, it is difficult to see how they could have intervened in any direct way in behalf of most pathological adaptations.

An illustration will make clear the points here involved. Suppose the human race, or any species of animal, to lack the power to compensate the disturbance of the circulation caused by a damaged heart-valve, and that an individual should happen to be born with the exclusive

capacity of such compensation. The chances are that there would arise no opportunity for the display of this new capacity, and it is inconceivable that the variety would be perpetuated through the operation of the law of survival of the fittest by natural selection, unless leaky or clogged heart-valves became a common character of the species. When, however, we learn that the disturbance of circulation resulting from disease of the heart-valves is compensated by the performance of increased work on the part of the heart, and that it is a general law that such prolonged extra work leads to growth of muscle, we see at once that this compensation is only an individual instance of the operation of a capacity which has abundant opportunities for exercise in normal life where the influence of natural selection and other factors of evolution can exert their full power.

In a similar light we can regard other compensatory and functional pathological hypertrophies—indeed, I believe, also to a considerable extent the pathological regenerations, inflammation, and immunity, although here the underlying factors are, of course, different.

We may, however, reasonably suppose that natural selection may be operative in securing protective adjustments, such as racial immunity, against morbid influences to which living beings are frequently exposed for long periods of time and through many generations.

These considerations help us to explain the marked imperfections of most pathological adaptations as contrasted with the perfection of physiological adjustments, although I would not be understood to imply that the absence of the direct intervention of natural selection in the former is the sole explanation of this difference. The cells are endowed with innate properties especially fitted to secure physiological adaptations. No other weapons than these same cells does the body possess to meet assaults from without, to compensate lesions, to restore damaged and lost parts. But these weapons were not forged to meet the special emergencies of pathological conditions. Evolutionary factors have not in general intervened with any direct reference to their adaptation to these emergencies. Such fitness as these weapons possess for these purposes comes primarily from properties pertaining to their physiological uses. They may be admirably fitted to meet certain pathological conditions, but often they are inadequate. Especially do we miss in pathological adjustments that co-ordinated fitness so characteristic of physiological adaptations. So true is this that the propriety of using such terms as compensation and adaptation for any results of pathological processes has been questioned.

A heart hypertrophied in consequence of valvular lesion does not completely restore the normal condition of the circulation. Experience has shown that a kidney hypertrophied in consequence of deficiency of the other kidney is more susceptible to disease than the normal organ.

What an incomplete repair of defects is the formation of scar-tissue, and with what inconveniences and even dangers may it be attended in some situations! If we look upon inflammation as an attempt to repair injury, and, therefore, as an adaptive process, with what imperfections and excesses and disorders and failures is it often associated! How often in some complex pathological process, such as Bright's disease or cirrhosis of the liver, can we detect some adaptive features, attempts at repair or compensation, but these overshadowed by disorganizing and harmful changes.

It is often difficult to disentangle in the complicated processes of disease those elements which we may appropriately regard as adaptive from those which are wholly disorderly and injurious. There are usually two sides to the shield, and one observer from his point of view may see only the side of disorder, and another from a different point of view, only that of adaptation.

The conception of adaptation in a pathological process is not wholly covered by that of benefit to the individual. I understand, as has already been said, by an adaptive pathological process one which in its results brings about some sort of adjustment to changed conditions. This adjustment is usually, wholly or in part, advantageous to the individual; but it is not necessarily so, and it may be harmful. The closure of pathological defects by new growths of tissue is a process which must be regarded as adaptive. But one would hardly describe as advantageous the scar in the brain which causes epilepsy. A new growth of bone to fill in defects is often highly beneficial; but what grave consequences may result from thickening of the skull to help fill the space left by partial arrest in development of the brain in embryonic life or infancy! We see here, as everywhere, that "Nature is neither kind nor cruel, but simply obedient to law, and, therefore, consistent."

In turning now to the more special, but necessarily fragmentary, consideration of a few of the pathological processes in which adaptation, in the sense defined, is more or less apparent, I shall have in view the answers to those two questions, What is the meaning of the process? and How is it caused? which confront us in our investigation of all natural phenomena. At the outset it must be admitted that our insight into the nature of many of these processes is very imperfect, and that here answers to the world-old riddles Why? and How? are correspondingly incomplete and liable to err.

Although almost all of the elementary morbid processes, even the degenerations and death of cells, may, under certain conditions of the body, serve a useful purpose—the pre-eminent examples of pathological adaptation, in the sense of restoration or compensation of damaged structure or function, or the direct destruction or neutralization of injurious agents, are to be found among the compensatory hypertrophies,



the regenerations, and the protective processes. To this last ill-defined group I refer parasiticial and antitoxic phenomena, and some of the manifestations of inflammation, and perhaps also of fever. In the last analysis these protective processes, no less than the others mentioned, must depend upon the activities of cells.

As it is manifestly impossible within the limits of a general address to attempt a detailed consideration of any large number of these adaptive pathological processes, and as such consideration would necessarily involve the discussion of many technical and doubtful points, I have thought that my purpose would be best served by the selection of a few representative examples.

The compensatory hypertrophies afford admirable illustrations of certain fundamental principles regarding adaptations in pathology which I have already stated. The hypertrophy secures a functional adjustment, often of a highly beneficial character, to certain morbid conditions. This useful purpose is attained by a succession of events determined from beginning to end by the necessary response of cells and tissues, in consequence of their inherent organization, to the changed conditions. Given the changed conditions, on the one hand, and the organization of the cells, on the other, the result must follow as surely as night follows day, and this final result influences the preceding series of events no more in the one case than in the other. That the cells possess the particular organization determining the manner of their response to these changed conditions, and, therefore, the beneficial character of the result, is dependent upon innate properties whose fitness for the purpose doubtless has been largely fixed by evolutionary factors, operating, however, mainly in behalf of physiological functions and not directly toward pathological adjustments. In correspondence with this view we find that our knowledge of the manner of production of the compensatory hypertrophies of various organs and tissues stands in direct relation to our knowledge of the physiology of the same organs and tissues.

Those compensatory hypertrophies into the mechanism of whose production we have the clearest insight are referable to increased functional activity, and are, therefore, spoken of as work-hypertrophies. This has been proved for the muscular hypertrophies and compensatory hypertrophy of the kidney; but the demonstration is not equally conclusive for the compensatory hypertrophy of other glands. I know, however, of no instance in which this factor in the explanation can be positively excluded.

The relationship between increased functional activity and hypertrophy is so evident in many cases that there is strong presumption in favor of this explanation of those glandular compensatory hypertrophies which have not as yet been clearly referred to the class of functional

hypertrophies. The very occurrence of compensatory hypertrophy of an organ may direct attention to the fact that it is endowed with definite functions, and the conditions under which the hypertrophy occurs may shed light upon the nature of these functions. I need only remind you of the significance from this point of view of the compensatory hypertrophy of the thyroid, adrenal, pituitary, and other glands with internal secretions. I fail to see why Nothnagel should consider *à priori* improbable the occurrence of compensatory hypertrophy of one sexual gland after loss of the other, even before sexual maturity, or why Ribbert, who has apparently demonstrated experimentally such an occurrence, should find it necessary to seek the explanation in reflex nervous influences or mere hyperæmia. The so-called secondary sexual characters and the changes following castration, including the influence upon a hypertrophied prostate, point to important, even if little understood, functions which for the present we can perhaps best attribute to so-called internal secretions of these sexual organs.

The name compensatory hypertrophy is sometimes applied to growths of tissue that merely take the place of another kind of tissue which has fallen out, as, for example, the growth of adipose tissue around a shrunken kidney or pancreas, or between atrophied muscle-fibres. Here there is only compensation of space, but no compensation of structure or function. Such hypertrophies and growths are described better as complementary than compensatory.

Familiar examples of pathological hypertrophies from increased work are the hypertrophy of the heart from valvular disease and other causes, that of the muscular coats of canals and bladders behind some obstruction, and that of one kidney after loss or atrophy of the other.

In order to understand fully the manner of production of work-hypertrophy of a part resulting from some morbid condition, it is essential to know the nature of the disturbances induced by the underlying morbid condition, how these disturbances excite increased functional activity of the part which becomes hypertrophied, and what the relation is between this greater activity and the increased growth of the part.

It is impossible on this occasion to go through the whole list of compensatory hypertrophies with reference to the application of these principles. In no instance can the requirements stated be completely met in the present state of our knowledge. It will suffice for an understanding of the principles involved, and it is only with these that I am now concerned, if I take a concrete example. I select the classical and best studied one—compensatory hypertrophy of the heart. I trust that I shall be pardoned for selecting so commonplace an illustration, as the main points involved must be familiar to most of my audience; but it is possible that the application made of them may not be equally familiar. The only matters essential to my present line of argument are the

mechanism of production of the hypertrophy and the general character of the adaptation thereby secured.

The heart, like other organs of the body, does not work ordinarily up to its full capacity, but it is capable of doing at least three or four times its usual work. The excess of energy brought into play in doing this extra work is called conveniently, although not without some impropriety, "reserve force." It has been proved experimentally that this storehouse of reserve power is sufficient to enable the healthy heart, at least that of a dog, to accommodate itself at once or after a few beats to high degrees of insufficiency or obstruction at its valvular orifices without alteration in the mean pressure and speed of the blood in the arteries. But even so tireless and accommodating an organ as the heart cannot be driven at such high pressure without sooner or later becoming fatigued, and consequently so dilated as to fail to meet the demands upon it. If it is to continue long the extra work, it must receive new increments of energy.

The cardiac muscle is far less susceptible to fatigue than the skeletal muscles, but that it may become fatigued seems to me clear.

Leaving out of consideration some doubtful causes of cardiac hypertrophy, such as nervous influences, the various morbid conditions which lead to this affection are such as increase either the volume of blood to be expelled with each stroke, or the resistance to blood-flow caused by the pressure in the arteries or by narrowing at one of the valvular orifices, or both. Unless some regulating mechanism steps in, each of these circulatory disturbances must increase the resistance to contraction of the cardiac muscle, and it is evident that the heart must do extra work if it is to pump the blood through the arteries with normal pressure and speed. It is, however, no explanation of this extra work simply to say that it occurs because there is demand for it. Increased work by the heart in cases of disease of its nutrient arteries would often meet a most urgent demand on the part of the body, but here the heart flags and fails.

The physiologists have given us at least some insight into the mechanism by which the heart responds through increased work to the circulatory disturbances which have been mentioned. These disturbances all increase the strain on the wall of one or more of the cavities of the heart; in other words, increase the tension of the cardiac muscle, in much the same way as a weight augments the tension of a voluntary muscle. Now it is a fundamental physiological law that with a given stimulus greater tension of a muscle, within limits, excites to more powerful contraction, and thus to the performance of greater work. It seems clear that this law applies to the muscle of the heart, as well as to voluntary muscle. We do not know precisely how increased tension facilitates the expenditure of greater muscular energy.

Another well-known fact in the mechanics of muscle is of importance in this connection. With increase of muscular tension under a given stimulus a point is reached where the extent of contraction is diminished, although the mechanical work done, determined by multiplying the height to which the load is lifted by the weight of the load, is increased. This law applied to the heart, whose contractions are always maximal for the conditions present at any given time, signifies that, with increased resistance to the contraction of the muscular wall of one of its cavities, this cavity will empty itself during systole less completely than before. In other words, dilatation occurs, and, as has been shown by Roy and Adami, to whom we owe important contributions on this as well as on many other points relating to the mechanics of the heart, dilatation regularly antedates hypertrophy. This primary dilatation, however, is not to be looked upon as evidence of beginning heart-failure, for, as these investigators have pointed out, it is within limits only an exaggeration of a physiological condition, and can be subsequently overcome by hypertrophy, which, in consequence of increase in the sectional area of the muscle, lessens the strain upon each fibre, and thereby permits it to shorten more during contraction. If this result is completely secured, we have simple hypertrophy. More often the dilatation remains, and must necessarily remain, and we have excentric hypertrophy, which secures, for a time at least, adequate, but I do not think we can say perfect, compensation.

The weight of existing evidence favors the view that the power of the heart to adapt its work to the resistance offered resides primarily in its muscle-cells, and not in intrinsic or extrinsic nervous mechanisms, although doubtless these latter in various ways, which cannot be here considered, influence and support this regulating capacity. Nor can I here pause to discuss the influence of blood-supply to the cardiac muscle upon the force of ventricular contraction, although Porter has demonstrated that this is important.

In tracing the steps from the primary morbid condition to the final hypertrophy, we have thus far had to deal mostly with known mechanical factors. We now come to the question, How does increased functional activity lead to increased growth?

Inasmuch as greater functional activity is regularly associated with a larger supply of blood to the more active part, the view is advocated by many that the increased growth is the direct result of this hyperæmia, and one often encounters, especially in biological literature, this opinion expressed as if it were an indisputable fact. There is, however, no conclusive proof of this doctrine, and many facts speak against it. The examples from human pathology commonly cited to support the doctrine that local active hyperæmia incites growth of cells are, so far as I am able to judge, complicated with other factors, such as injury, inflam-

mation, or trophic disturbances. Transplantation-experiments, such as John Hunter's grafting the cock's spur upon the cock's comb, sometimes adduced in this connection, are not decisive of this question, for here a new circumstance is introduced which some suppose to be the determining one for all morbid cell-growth, namely, the disturbance of the normal equilibrium between parts. Local active hyperæmia may exist for a long time without evidence of increased growth in the congested part. To say that the hyperæmia must be functional is at once to concede that it is not the sole factor. Experiments from Bizzozero's laboratory, by Morpurgo and by Penzo, indicate that local hyperæmia due to vasomotor paralysis, or to the application of heat, favors cell-multiplication in parts where proliferation of cells is a normal phenomenon or is present from pathological causes, but that it is incapable of stimulating to growth cells whose proliferating power is suspended under physiological conditions, as in developed connective tissue, muscles, and the kidneys.

It has been usually assumed that the way in which local hyperæmia may stimulate cell-growth is by increasing the supply of nutriment to cells. The trend of physiological investigation, however, indicates that the cell to a large extent regulates its own metabolism. If the cell needs more food, of course it cannot get it unless the supply is at hand, and in this sense we can understand how a larger supply of blood may be essential to increased growth, but this is a very different thing from saying that the augmented blood-supply causes the growth.

It is by no means clear that the question as to the influence of increased blood-supply upon cell-growth is identical with that of increased lymph-supply. The experiments of Paschutin and of Emminghaus, from Ludwig's laboratory, nearly a quarter of a century ago, indicate that local hyperæmia due to vasomotor paralysis does not, as a rule, increase the production of lymph; and more recent experiments, although not wholly concordant in their results upon this point, tend to the same conclusion. Functional activity, however, has a marked influence in increasing the quantity and affecting the quality of lymph in the active part. Our knowledge of the physical and chemical changes in working muscles and glands enables us to conceive why this should be so, for all are now agreed that the formation of lymph is due not simply to filtration from the blood-plasma, but also to diffusion, and some believe likewise to active secretion by the capillary endothelium. Doubtless arterial hyperæmia is essential to the maintenance of the increased flow of lymph in working organs.

There are difficulties in the way of supposing that increased supply of lymph in itself furnishes the explanation of cell-growth, and especially of that which characterizes hypertrophy of muscles and glands. Pathologists have frequent opportunities to study the effects of all degrees of increased production and circulation of lymph associated

with venous hyperæmia. A kidney or a muscle may from this cause be subjected for months and years to an excess of lymph-flow, but there is no demonstration of any consequent hypertrophy or hyperplasia of renal epithelium or muscle-cell. It is true that the chemical composition of the lymph is not the same as that of lymph resulting from increased function, and it is possible that in this chemical difference lies the kernel of the whole matter. It may also be urged that in venous hyperæmia there are circumstances which restrain or prevent growth. Nevertheless, if overfeeding, merely in consequence of increased supply of nutriment, were the real explanation of work-hypertrophies, one would expect to find some evidence of this in the class of cases mentioned.

Ribbert has recently given a new shape to the doctrine that local hyperæmia excites growth. While rejecting the usual explanation that it does so by supplying more food, he contends that distention of the bloodvessels and lymph-spaces, by mechanically disturbing the mutual relations of parts, removes obstacles to growth. This theory cannot be advantageously discussed until the fact is first established that uncomplicated local hyperæmia does incite growth.

As the matter now stands, it seems to me that any satisfactory explanation of the cell-growth causing work-hypertrophies must start from physical or chemical changes in the muscle- or gland-cell itself directly connected with the increased function. These changes are the *primum mobile*, and, however important increased supply of blood or lymph may be in the subsequent chain of events, it is not the determining factor. The whole problem is part of the general one of the causes of pathological cell-growth, to which I shall have occasion to refer again.

It is interesting to note that not all kinds of excess of functional activity lead to hypertrophy. A heart may beat for years faster than normal without becoming hypertrophied. Small movements of muscle, often repeated, do not cause hypertrophy. It would appear that the amount of work done in each functional act must attain a certain height in order to stimulate growth. On the other hand, if the muscle be stretched beyond certain limits, it does not hypertrophy; on the contrary, it may atrophy, as may be seen in greatly distended canals and cavities with muscular walls. This behavior is also in accordance with physiological observations.

The compensatory hypertrophy of muscle seems to be due mainly to increase in the size of cells, although there are observations indicating that they may also multiply. That of most glands is referable to increase both in number and size of cells. Within four or five days after extirpation of a kidney karyokinetic figures may be found in increased number in the cells of the remaining kidney.

The general character of the adaptation secured by compensatory hypertrophy of the heart is sufficiently well known. I wish to point

out certain of its imperfections. I shall not dwell upon the well-known abnormal conditions, with their remote consequences, of the systemic or pulmonary circulation, which are present during the stage of compensation, nor shall I speak of the various circumstances which may interfere with the establishment of compensatory hypertrophy.

The muscle of a hypertrophied heart is sometimes compared to that of the blacksmith's arm, and the statement is made that there is no reason inherent in the muscle itself why the one should fail more than the other. This may be true, but it is not self-evident. Exercise may influence in various ways the nutrition, function, and growth of muscle as well as of other parts. Mere increase in bulk is a coarse effect. Quality may be improved as well as quantity. The biggest muscle is not necessarily the best or the most powerful. As every trainer knows, various conditions under which work is done influence the result. Increase in the reserve energy of the heart, secured by judicious exercise—and this is the main factor in endurance—probably cannot be attributed mainly to hypertrophy; indeed, enlargement of this organ from exercise is often a serious condition. Much more might be said in this line of thought, but I have indicated why it seems to me unjustifiable to assume, without further evidence, that the condition of the muscle in pathological hypertrophies is necessarily identical in all respects with that in physiological hypertrophies.

There is an important difference in the working-conditions between most hypertrophied hearts and the normal heart. Although the maximal available energy of a hypertrophied heart during compensation is greater than that of the normal heart, clinical experience shows that in the majority of cases the energy available for unusual demands—that is, the so-called reserve force—is less in the former than in the latter. Sometimes, especially when the hypertrophy has developed in early life, the hypertrophied heart is at no disadvantage in this respect. As pointed out with especial clearness by Martius, the significance of this alteration in the ratio normally existing between the energy expended for ordinary needs and that available for unusual demands, is that it furnishes an explanation of the greater liability of the hypertrophied heart to tire upon exertion. Fatigue of the heart is manifested by dilatation of its cavities, and when this dilatation from fatigue is added to that already existing in most cases, relative insufficiency of the mitral or tricuspid valve is likely to occur, and the compensation is, at least for a time, disturbed. The circulation through the coronary arteries, whose integrity is so important for the welfare of the heart, is impaired, and a vicious circle may be established. Notwithstanding the valuable contributions from the Leipzig clinic as to the frequency of various anatomical lesions in the muscle of hypertrophied hearts, it does not seem to me necessary to have recourse to them as an indispensable factor in the explanation of

the breakage of compensation; but I shall not here enter into a discussion of the general subject of the causes of failure of compensation.

I have described with some detail, although very inadequately, the manner of production of compensatory hypertrophy of the heart, in order, by this representative example, to make clear what seem to me to be certain general characteristics of many adaptive pathological processes, and I beg here to call attention especially to the following points. As has been emphasized by Nothnagel and others, no teleological idea or form of language need enter into the explanation of the mechanism of the process. The final result is the necessary consequence of the underlying morbid conditions. We have satisfactory mechanical explanations for essential steps in the process, and there is no reason to assume that other than mechanical factors are concerned in those vital manifestations which at present we are unable to explain by known physical and chemical forces. The properties of the cells which determine the character of their response to the changed conditions are none other than their well-known physiological properties. The adaptation finally secured, admirable as it is in many respects, and perhaps adequate for a long and active life, is generally attended with marked imperfections, and, strictly speaking, is not a complete compensation. It does not present that co-ordinate and special fitness which we are accustomed to find in physiological adaptations, for the explanation of which so much has been gained by the study of the factors concerned in organic evolution.

It may be argued that under the circumstances no better kind or degree of adaptation can be conceived of than that which actually occurs, and that the operation of evolutionary factors, with especial reference to the adjustment of the organism to the conditions causing cardiac hypertrophy, could not secure any better result. I think that it is not difficult to conceive how improvements might be introduced. It is, however, permissible to suppose that the introduction into the workings of the organism of some better mechanism to compensate the morbid conditions might be at the sacrifice of more important physiological attributes of the body. More perfect pathological adaptations might in many instances involve a deterioration of the physiological characters of the species. It is often the case that the more highly organized living beings lack some capacity possessed by those lower in the scale of organization to resist or compensate injury and disease. This is notably true of the power to regenerate lost parts. It is, however, along the lines of improvement in the physiological characters of the individual or species that the opportunity often lies for securing increased resistance to disease or better pathological adaptations.

It would be interesting to continue our consideration of the compensatory hypertrophies by an examination of those of glandular organs from points of view similar to those adopted for the heart. For the kidney,



at least, the materials are at hand for such a purpose; but, as I desire in the limited time at my disposal to touch upon other varieties of pathological adaptation, I must refer those interested especially to the investigations of Grawitz and Israel, Ribbert, Notknagel, and Sacerdotti as to the conditions underlying compensatory hypertrophy of the kidney. I can likewise merely call attention to the interesting researches of Ponfiek upon the most wonderful of the compensatory hypertrophies in higher animals, that of the liver. Ponfiek, as is well known, has demonstrated that after removal of three-fourths of this organ new liver-substance, with normal functions, is recreated from the remainder and to an amount nearly equalling that which was lost.

The chapter of pathological adaptations in bones and joints I shall leave untouched, notwithstanding the admirable illustrations which might be drawn from this domain.

There is no more fascinating field for the study of pathological adaptations with reference to the mechanical factors involved than that furnished by the bloodvessels, as has been shown especially by the brilliant researches of Thoma. With wonderful precision can a vessel or system of vessels adjust itself to changes in the pressure, velocity, and quantity of blood, and thereby serve the needs of the tissues for blood. Under pathological, as well as physiological, conditions this adjustment may be brought about not only through the agency of vasomotor nerves and the physical properties of the vascular wall, but also, when the necessity arises, by changes in the structure of the wall.

The changes in the circulation introduced by the falling out of the placental system at birth are essentially the same as those resulting from amputation of an extremity, and the consequent alterations in the structure of the umbilical artery are identical with those in the main artery of the stump after amputation. The closure of the ductus Botalli and the ductus venosus soon after birth, and, still better, transformations of vessels in the embryo, furnish physiological paradigms for the development of a collateral circulation. Many other illustrations might be cited, did time permit, to show that in the processes of normal development, growth and regressive metamorphosis of parts, both before and after birth, and in menstruation and pregnancy, changed conditions of the circulation arise analogous to certain ones observed under pathological circumstances, and that the mode of adjustment to these changes by means of anatomical alterations in the vessels may be essentially the same in the physiological as in the morbid state. I see in these facts an explanation of the relative perfection of certain vascular adaptations to pathological or artificial states, as may be exemplified by changes in a ligated artery and by the development of a collateral circulation. The mechanisms by which the adjustments are secured have, in consequence of their physiological uses, for reasons already explained, a special

fitness to meet certain pathological conditions. That this fitness should be greater in youth than in old age is in accordance with laws of life, indicated with especial clearness by Minot in his interesting studies on "Senescence and Rejuvenation."

But these mechanisms are not equally well adapted to meet all morbid changes in the vessels. Although Thoma's interpretation of the fibrous thickening of the inner lining of vessels in arteriosclerosis and aneurism as compensatory, or, as I should prefer to say, adaptive, is not accepted by all pathologists, it seems to me the best explanation in many cases. But the adaptation, if it be such, is here usually of a very imperfect nature, and it is not surprising that it should be so, when one considers the improbability of any mechanism developing under physiological conditions which should be specially fitted to meet the particular morbid changes underlying aneurism and arteriosclerosis.

I shall not be able to enter into a consideration of the mechanical factors concerned in adaptive pathological processes in bloodvessels, although perhaps in no other field are to be found more pertinent illustrations of the views here advocated concerning pathological adaptations. The whole subject has been studied from the mechanical side most fully and ably by Thoma, whose four beautifully simple histo-mechanical principles are at any rate very suggestive and helpful working-hypotheses, even if it should prove, as seems to me probable, that they are too exclusive. I shall call attention in this connection only to the inadequacy of the old and still often adopted explanation of the development of a collateral circulation. The rapidity with which a collateral circulation may be established after ligation of a large artery, even when the anastomosing branches are very small, is known to every surgeon. This was formerly attributed to increase of pressure above the ligature; but this rise of pressure has been shown to be too small to furnish a satisfactory explanation, and Nothnagel has demonstrated that there is little or no change in the calibre of arteries coming off close above the ligature unless they communicate with branches arising below the ligature. Von Recklinghausen several years ago suggested a better explanation. The bed of the capillary stream for the anastomosing arteries is widened by ligation of the main artery, inasmuch as the blood can now flow with little resistance from the capillaries of the anastomosing branches into those of the ligated artery. The result is increased rapidity of blood-flow in the anastomosing vessels. According to one of Thoma's histo-mechanical principles, increased velocity of the blood-current results in increased growth of the vessel-wall in superficies—that is, in widening of the lumen. The tension of the vessel-wall, which is dependent on the diameter of the vessel and the blood-pressure, is, according to Thoma, thus increased; and, according to another of his principles, this greater tension results in growth of the

vascular wall in thickness. The changes in the walls of the anastomosing vessels seem to me best interpreted as referable to a genuine work-hypertrophy, a conception which has already been advanced by Ziegler.

The pathological regenerations constitute a large group of adaptive morbid processes of the highest interest. Their study has become almost a specialized department of biology, and occupies a very prominent place in the extensive literature of recent years relating to experimental or physiological morphology. It has revealed in unexpected ways the influence of external environment upon the activities of cells, as is illustrated in a very striking manner by Loeb's studies of heteromorphosis.

Although the capacity to regenerate lost parts must reside in the inherited organization of the participating cells, there are observations which seem to indicate that in the lower animals this capacity may exist independently of any opportunity for its exercise during any period of the normal life of the individual or species or their ancestors, including the period of embryonic development. This is the inference which has been drawn from Wolff's observation, that after complete extirpation of the ocular lens with the capsular epithelium in the larval salamander, a new lens is reproduced from the posterior epithelium of the iris. There are other observations of similar purport. The acceptance of this inference, however, seems to me to involve such difficulties that we may reasonably expect that further investigations will afford more satisfactory explanations of these curious and puzzling phenomena of regeneration. Of much interest and significance are the so-called atavistic regenerations, where the regenerated part assumes characters belonging not to the variety or species in which it occurs, but to some ancestral or allied species. For these and other reasons Driesch refers the pathological regenerations to what he calls the secondary self-regulations, by which term he designates those adjustments of artificially induced disturbances which are brought about by factors foreign to the normal development and life of the individual.

The view advocated by Barfurth seems to me more probable, that the pathological regenerations depend upon cellular properties pertaining to the normal life of the organism. This view is supported by the fact that, with a few probably only apparent exceptions, the regenerations conform to the law of specificity of cells. The pathological regenerations occurring after birth can be referred to the retention in greater or less degree of formative powers possessed by the cells pre-eminently in embryonic life. These powers in general tend gradually to diminution or extinction as the individual grows older, although in some cells, such as the covering epithelium of the skin and mucous membranes, this loss of regenerative power with advancing years is scarcely manifest. Even after the cessation of growth the regenerative capacity is not wholly in

abeyance under physiological conditions. Bizzozero has studied and classified the various tissues of the body according to the activity of their physiological regeneration.

In general, the more highly differentiated and specialized a cell, the less is its capacity for regeneration; but we now know that such differentiation is attended with less sacrifice of its regenerative power than was once supposed. Even such highly specialized cells as those of striped muscle are capable of regeneration. Indeed, the nerve-cells seem to be the only ones incapable of proliferation, and even this is not certain, for there are competent observers who claim that these cells may multiply, although there is no evidence that in the higher animals they can give rise to functionally active new nerve-cells. The ease with which a part of the nerve-cell, namely, its axis-cylinder process, can be regenerated is well known.

The cell-proliferation in regeneration is attributed to the removal of resistance to growth in consequence of the defect resulting from loss of tissue. It has been pointed out, especially by Ziegler and by Ribbert, that not only cells in the immediate neighborhood of the defect multiply, but likewise those at such a distance that it is difficult to suppose that the latter have been directly influenced by the loss of tension in the tissues caused by the defect. Ziegler refers the proliferation of the distant cells to compensatory hypertrophy, and Ribbert attributes it to hyperæmia resulting from the presence in the defect of foreign materials, such as extravasated blood, exudation, and necrotic tissue.

We are brought here, as we were in the consideration of the compensatory hypertrophies, to one of the most fundamental and important questions in pathology—the causes of pathological cell-growth. The interpretation of many pathological processes as adaptive or not, hinges often upon opinions held concerning the underlying causes of cell-proliferation. The main question at issue is, How far one is willing to go in attributing cell-growth to primary defects in the tissue, and interpreting the growth as for the purpose of regeneration or filling up a defect? Differences of opinion upon this subject are illustrated by the different interpretations of the cell-proliferations in acute and chronic inflammations, some pathologists considering these to be essentially regenerative and compensatory; others regarding them, at least in large part, as directly incited by inflammatory irritants and not to be ranked wholly with the regenerative processes.

The doctrine of Virchow was long accepted without question, that inflammatory cell-growth is the result of the action of external stimuli, the so-called inflammatory irritants, upon the cells, which are thereby directly incited to grow and multiply. The attack upon this doctrine has been most vigorously led by Weigert, who denies absolutely the power of any external agencies to stimulate directly cells to prolifera-

tion. He considers that to concede such a bioplastic power to external agents is equivalent to the acceptance of a kind of spontaneous generation of living matter.

Weigert's views upon this subject have undoubtedly had a most fruitful influence upon pathology. It has been such an influence as a good working-hypothesis, whether finally demonstrated to be true or not, has often had in the development of science. In putting to the test of actual observation Weigert's hypothesis, we have been led to recognize the frequency and the importance of primary injuries to cells inflicted by external agencies. Not only various degenerations and necroses of entire cells, but more subtle and partial damage of cytoplasm and nucleus have been made the subject of special study. It has been recognized that our older methods of hardening tissues reveal often only very imperfectly the finer structure of cells, and new and better methods have been introduced which enable us to detect more delicate lesions of cell-substance which formerly escaped attention, as is well illustrated in recent studies in neuropathology. Weigert's postulate of some primary injury to the tissues as the immediate effect of mechanical, chemical, and other external agencies, which were formerly regarded as the direct stimuli of cell-growth and multiplication, has been fulfilled in many instances where such damage had previously been overlooked or unsuspected. It is his belief that in cases where we cannot now detect such primary injury more thorough search and better methods will enable us to do so. One may, of course, reasonably cherish such an expectation; but at the same time we must recognize the fact that morbid cell-proliferations occur under circumstances where we cannot at present associate them with any demonstrable injury to the tissues—indeed, in some cases where our insight into the structure of the part seems to be so clear and satisfactory that one is very reluctant to admit the existence of an undetected damage to the cells.

Perhaps the most important modification of former pathological conceptions, resulting from the belief that cell-growth is caused by primary defects and injuries of tissue, relates to the chronic interstitial inflammations or fibroid processes. The older view that in these processes the active and essential feature of the disease is the new growth of connective tissue, which strangled the more highly organized cells of the part, has been replaced to a large extent by the opinion that the primary and most important lesion is the degeneration, atrophy, or necrosis of the more specialized cells, whose place is taken by the new growth of interstitial tissue. In many instances, as in fibroid patches in the myocardium, and in many scleroses of the central nervous system, this latter conception affords the best and most natural interpretation of the facts. There are, however, great difficulties in explaining all chronic interstitial inflammations by this doctrine, and I must take side with those who

admit the occurrence, for example, in the kidney and in the liver, of primary interstitial inflammations characterized by proliferation of the connective tissue and endothelial cells.

Indeed, it seems to me that Weigert's formula is too narrow to cover all of the observed facts concerning cell-proliferation. Essential features of the theory that cells cannot be directly stimulated to growth by external agents were present in Boll's doctrine of border warfare between neighboring cells. Weigert's presentation of this theory is in a far more acceptable shape than that of Boll. A still more comprehensive statement of the general theory is that cells are incited to growth through removal of obstacles to growth in consequence of some disturbance in the normal relations or equilibrium of the cells with surrounding parts. The capacity to proliferate must be present in the cells, but with the cessation of growth this capacity is rendered latent or potential by the establishment of definite relations or an equilibrium between cells and neighboring parts, including under the latter not only adjacent cells, but also basement-substance, lymphatics, bloodvessels, tissue-juices, chemical substances, etc. It is evident that under these circumstances in only two ways can the cells be incited to growth, either by removal of resistance or obstacles to growth, or by an increase in the formative energy resident within the cell, and that in either way energy must be used, whether it be employed to remove obstacles to growth or to increase the proliferative forces within the cell.

It appears to me by no means an easy matter to decide in all cases in which of the two ways mentioned cell-proliferation is brought about. Removal of obstacles to growth, not only in the way indicated by Weigert, but also by other disturbances in the neighborhood-relations of the part, and very probably by the presence of definite chemical substances, may be the explanation of all pathological cell-growths. Certainly it would not be easy conclusively to disprove this view. Nevertheless, I fail to comprehend the inherent difficulties which some find in admitting the possibility of forms of energy, acting from without, directly increasing the formative energy of the cell; in other words, directly stimulating the cell to growth and multiplication. If such a possibility be admitted, the natural interpretation of some examples of cell-proliferation is that they are directly caused by the action of external forces, in the sense advocated by Virchow.

Students of the problems of pathological cell-growth must take into consideration not only the facts of human and allied pathology, but also those which are so rapidly accumulating in the domain of experimental embryology and morphology, to the importance of which I have repeatedly referred in this address. I would call attention especially to the observations from this source as to the influence of various changes of environment, particularly of definite chemical, thermic, and mechan-

ical changes in surrounding parts, upon the direction of movement and of growth of cells. The use at present made of chemotactic phenomena in explaining the direction of movement of cells in human pathological processes is only a very limited and inadequate application of these important observations concerning tactic and tropic stimuli. We shall probably come to realize more and more the operation of these factors in determining cell-movements and cell-growth in human pathology. We already have evidence that different kinds of leucocytes not only possess different specific functions, but also respond in different ways to definite tactic stimuli. The long-standing problem of the lymphoid cell in inflammation approaches solution along these lines of investigation.

A burning question, and one of perennial interest, relating to our subject is: How far are we justified in regarding acute inflammation as an adaptive or protective morbid process? There is fair agreement as to the essential facts of observation, but regarding their interpretation there are wide differences of opinion, and when one considers the complexity of the process and its still unsolved riddles, it is not hard to see why this should be so. Much depends upon the point of view, and in this respect there can be recognized a certain antagonism between the purely clinical and the purely pathological and experimental views, an antagonism, however, which must be reconciled by a full knowledge of the subject.

It is not likely that the purely clinical study of inflammation would ever lead to the idea that the general tendency of this process is advantageous to the patient. The more severe and extensive the inflammatory affection, the more serious, as a rule, is the condition of the patient. The surgeon sees his wounds do well or ill according to the character and extent of inflammatory complication. Measures directed to the removal of inflammatory exudation, such as the evacuation of pus from an abscess or an empyema, are the most successful methods of treatment, and the rules are embodied in ancient surgical maxims. How can one conceive of any purpose useful to the patient served by filling the air-cells of his lung with pus-cells, fibrin, and red corpuscles in pneumonia, or bathing the brain and spinal cord in serum and pus in meningitis? If nature has no better weapons than these to fight the pneumococcus or meningococcus, it may be asked, "What is their use but to drive the devil out with Beelzebub?"

But the pathologist and bacteriologist sees another aspect of the picture. An infectious micro-organism has invaded the tissues, where it multiplies and where its toxic products begin to work havoc with the surrounding cells, and by their absorption to cause constitutional symptoms and perhaps damage to remote parts. Is the destructive process to go on without any defence on the part of the body? There is attracted to the injured part an army of leucocytes from the bloodves-

sels, and perhaps other cells, from the neighboring tissues, and it has been conclusively shown that these cells can pick up foreign particles and remove them, and that they contain substances capable of destroying many micro-organisms. At the same time serum accumulates in and around the injured area, and this may aid by its chemical properties in destroying bacteria, in diluting poisons, in flushing out the part. Fibrin may appear, and some think that this may serve in some situations as a protective covering. If these agencies, hostile to the invading micro-organism, gain the upper hand, the débris is cleared away by phagocytes and other means, and the surrounding intact cells, which had already begun to multiply, produce new tissue which takes the place of that which had been destroyed. The victory, however, is not always with the cells and other defensive weapons of the body. The struggle may be prolonged, may be most unequal, may cover a large territory, and the characters and extent of the inflammation furnish an index of these different phases of the battle.

Such in bald outlines are two divergent views of inflammation.

I do not see how we can fail to recognize in that response to injury, which we call inflammation, features of adaptation. Inflammation may be in some cases the best response to secure the removal or destruction of injurious agents, but we cannot look upon it as the most perfect mode of protection of the body against invading micro-organisms. One may inoculate into three animals, even of the same species, but possessed of different individual resistance, the same quantity of the same culture of a pathogenic micro-organism and obtain sometimes the following results: The first one will present no appreciable inflammatory reaction whatever, and no evidences of any other disturbance, and examination will show that the micro organisms have quickly disappeared. The second one will develop an extensive local inflammation and survive, but after a long illness. The third one will offer little resistance to the micro-organism, which rapidly multiplies without causing marked inflammation, invades the blood or produces toxæmia, and quickly destroys the life of the animal. Now, it is evident that the best protective mechanism is that brought into action by the first animal, but that the inflammatory reaction set up in the second one is better than the absence of reaction and of other defences in the third animal.

I can scarcely do more on this occasion than to indicate some of the points of view from which it seems to me that we can best approach the study of inflammation as an adaptive process. With inflammation, as with other adaptive processes, any useful purpose subserved affords no explanation of the mechanism of the process. We should guard against all ideas which introduce, even unconsciously, the conception of something in the nature of an intelligent foresight on the part of the participating cells. The response of these cells in inflammation is a necessary



and inevitable one determined by their innate properties. Our efforts should be directed, in the first place, toward as near an approach as possible to a mechanical explanation of inflammatory processes by a study, on the one hand, of the properties and mode of action of the causes of inflammation, and, on the other hand, of the nature and source of the cellular properties concerned. We may properly inquire whether these properties fit the cells to counteract the effects of injury, and if so, whence comes this fitness. Has the fitness those attributes of relative perfection which we find in most physiological adaptations, or is it characterized by the uncertainties and imperfections of so many pathological adaptations? Is the character of the response to injury in inflammation such as to indicate that the agencies concerned have acquired through evolutionary factors a special fitness to meet the pathological emergencies? Are all or only a part of the manifestations of the inflammatory processes adaptive?

It cannot be doubted that there are innate properties of certain cells called into action in inflammation, such as those manifested in the attraction of leucocytes and other cells by definite chemical substances, the capacity of cell-proliferation from causes connected with injury, the power of phagocytosis and other bactericidal properties, which may be adapted to counteract the effects of injurious agents. When these forces bring about the prompt destruction or removal of the injurious substances, and the defect is quickly repaired, the adaptation is complete and unmistakable. When, however, the inflammatory irritants and their destructive effects persist, and the proliferation of cells and accumulation of inflammatory products become excessive and occupy large areas, the features of adaptation are not so easily recognized. The mere occupation of territory by inflammatory products is often a serious injury and it can be regarded as an adaptive feature only when they fill some artificial defect. Such occupation may be in itself enough to counteract any useful work in which these products may be engaged.

We can reasonably seek in the relations of the body to the outer world an explanation of the development of certain properties of cells which serve a useful purpose in mechanical and other injuries. These properties find application also in the normal life of the organism. Their exercise in response to injury imparts to inflammation important adaptive or protective characteristics, but I fail to see in this process any such special fitness as would justify extravagant statements which have been made to the effect that inflammation ranks among the adaptations of living beings by the side of digestion and respiration.

I have endeavored in this address to present certain general considerations concerning pathological adaptations. It has been possible to bring under consideration only a small part of an immense field, and this very inadequately. We have seen that in the sense in which adap-

tation was defined we can recognize in the results of morbid processes frequent and manifold evidences of adjustment to changed conditions. These adjustments present all degrees of fitness. Some are admirably complete; more are adequate, but far from perfect; many are associated with such disorder and failures that it becomes difficult to detect the element of adaptation. The teleological conception of a useful purpose in no case affords an explanation of the mechanism of an adaptive process. I have suggested that the adaptability of this mechanism to bring about useful adjustments has been in large part determined by the factors of organic evolution, but that in only relatively few cases can we suppose these evolutionary factors to have intervened in behalf of morbid states. For the most part, the agencies employed are such as exist primarily for physiological uses, and while these may be all that are required to secure a good pathological adjustment, often they have no special fitness for this purpose.

The healing power of nature is, under the circumstances present in disease, frequently incomplete and imperfect, and systems of treatment based exclusively upon the idea that nature is doing the best thing possible to bring about recovery or some suitable adjustment, and should not be interfered with, rest often upon an insecure foundation. The agencies employed by nature may be all that can be desired; they may, however, be inadequate, even helpless, and their operation may add to existing disorder. There is ample scope for the beneficent work of the physician and surgeon.

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## CANCER OF THE STOMACH IN EARLY LIFE,

AND THE VALUE OF CELLS IN EFFUSIONS IN THE DIAGNOSIS OF CANCER  
OF THE SEROUS MEMBRANES.<sup>1</sup>

By GEORGE DOCK, M.D.,

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C. McK., aged twenty years, farmer, born in Michigan, was admitted to the University Hospital October 21, 1896. He complained of an "obstruction in the gullet," pain in the epigastrium, between the shoulders and in the small of the back.

*History.* The family history is negative as to new-growth and tuberculosis. The father (aged seventy-five years) and mother (aged fifty-three years) are alive and well. There are four brothers and four sisters living and well.

The patient was well up to October, 1895, not having had the common diseases of childhood. At the time given he had a pain in the epigastrium and the lower part of the thorax, so severe as to cause him to

<sup>1</sup> Read before the Association of American Physicians at the meeting in Washington, May 4-6, 1897.

"double up." At the same time there was a choking sensation in the throat, and a good deal of mucus was raised. A week later difficulty in swallowing was noticed. The food seemed to stop in the throat, and an effort was required to pass it down. This persisted to the present time. Frequently the food comes up with some force as soon as swallowed. For some time it has been impossible to swallow solid food, except after careful mastication. The patient denies actual vomiting; says he has never vomited blood. For the first six months there were almost daily attacks of "cramp" in the epigastrium. In February the patient had measles. This left him weak, and he was unable to walk for three weeks. In March the abdomen began to enlarge. Much flatus was passed; the bowels were constipated. After that the patient improved, gaining strength; but in August he again became weak. Two weeks before admission the legs began to swell. From the beginning of the disease the patient had to pass water two or three times at night. During the last two weeks the quantity of urine has diminished.

The appetite is good. The bowels are very constipated; sometimes there is no stool for two weeks.

*Present condition, October 23, 1896:* slender frame, of medium size; extreme emaciation; skin dry, harsh, very pale, as are also the visible mucous membranes. No jaundice; no cyanosis. There is œdema of the legs, the dependent parts of the thighs, and in the back from the sacrum to the lower dorsal region. The œdema is soft, the skin over it glossy. The nails are curved, but the fingers not clubbed.

The mind is clear; the voice weak. The special senses are normal; the eyes lustreless; expression weary. The tongue is small, smooth for the most part, but with irregular, elevated white patches on the middle and sides. The gums are red and slightly ulcerated.

The lymph-nodes in the supraclavicular regions are slightly enlarged.

The thorax is long, narrow, and flat; the expansion slight, but symmetrical. Percussion of the upper parts of the thorax alike on both sides. In front the note is short and high pitched. In the back dulness begins on the line of the ninth dorsal spine on both sides. Auscultation reveals weak vesicular breathing all over, with no adventitious sounds. In the dorsal position the liver-dulness cannot be made out. On sitting up dulness is encountered on the fifth rib in the nipple-line, moving freely with respiration. An inch lower down tympanitic resonance is obtained.

In the left axillary line stomach tympany is found on the fifth rib.

The apex-beat is in the fourth interspace one cm. inside the nipple-line. Heart dulness begins in the third intercostal space, extends from the left edge of the sternum within a centimetre of the nipple. The sounds at the apex are weak but clear. The second pulmonary sound is accentuated. The radial pulse is small, soft, regular.

The abdomen is much distended, measuring thirty inches at the umbilicus. There is tympanitic resonance all over the front to within three finger-breadths of the os pubis. The right flank is tympanitic. In the left flank there is dulness up to the anterior axillary line. On sitting, dulness reaches to the umbilicus. There is fluctuation. Palpation of the abdomen negative, the walls being extremely tense.

The splenic dulness, when the patient lies on the right side, is found in the normal position, measuring four by two centimetres.

Examination of the pharynx negative. A soft stomach-tube, 1.1 cm.

in diameter, is swallowed easily for 39 cm. (from the upper incisors), but cannot be passed further. The tube shows no remains of food on withdrawal. [Patient has been on milk-diet since yesterday.] Larger olive tips on whalebone stem cannot be passed beyond the point mentioned, but one 9.5 mm. in diameter goes through after passing a firm but elastic obstruction behind, at the distance mentioned, measured on the stem. On account of the obstruction and the patient's cachexia no effort was made to test the stomach digestion.

Temperature since admission has been between 97.8° and 99° F.; pulse 90 to 104; respiration 20 to 24.

Urine (sample) turbid with urates, contains no albumin nor albumose, nor sugar; diazo-reaction negative. Sediment negative.

*October 24.* The patient has had no new symptoms. Has taken in the last twenty-four hours twenty ounces of milk. Weight 108 pounds. Aspirated ascites with small syringe, removing 10 c.cm. of yellow, opaque alkaline fluid. Heat and nitric acid cause a large yellow precipitate. Acetic acid in excess causes a faint increase of the turbidity, and the addition of potassium ferrocyanide throws down a firm coagulum. Fehling's test negative. Solution of caustic soda clears up turbidity slightly, increased by the addition of ether, but ether alone produces no change.

A small sediment obtained by centrifugalization shows numerous round or oval cells two to four times the diameter of a red blood-corpuscle, some much larger, very few small cells, and red blood-cells. The larger cells contain numerous bright granules, and some of them vacuoles, either one or many small ones or one large one, giving the cell a ring shape, with the nucleus more or less compressed.

No tubercle bacilli could be found.

[A guinea-pig inoculated remained free from tuberculosis.]

*Blood examination.* Blood flows freely, thin and somewhat pale. Red blood-corpuscles 3,230,000. Leucocytes 6200. Hæmoglobin (Gowers) 40 per cent. Differential count (1030 cells): small lymphocytes, 3.8; large lymphocytes and mononuclear, 13.8; multinuclear, 80.5; eosinophile, 0.48; degenerate, 1.1.

Punctured with a trocar above the pubes, removing 4700 c.cm. of fluid. The fluid is bright yellow; opaque; specific gravity 1010; alkaline. Albumin (dry by weight, after coagulating with heat and acetic acid, washing with large quantities of water, alcohol, and ether), 3.8 per cent. Biuret-test, after removal of albumin, negative. Bile coloring-matter test (fuming nitric acid) negative. Fehling's test negative. Diastase test negative. On extracting 100 c.cm. with ether, after the addition of caustic-soda solution, a few small drops of yellow oil are obtained. Prolonged centrifugalization does not clear up the fluid nor produce a fat layer. On standing over night in a 250 c.cm. cylinder a white layer forms 3 mm. thick, which under the microscope shows small oily-looking globules soluble in ether.

The centrifuge brings down numerous cells such as were obtained before. These contain many bright granules and vacuoles of various sizes. Soda solution does not dissolve the granules at once, but after remaining in ether and alcohol half an hour nearly all the granules disappear. Acetic acid clears up the bodies of the cells and makes the nucleus distinct, but does not affect the granules. Iodine solution stains the nuclei and protoplasm as usual, but does not show the

so-called glycogen reaction (either in fresh or dried preparations). Methylene-blue in watery solution added to the fresh sediment stains the nuclei, as in dried preparations.

The cells were spread on cover-glasses, dried in the air and fixed with ether and absolute alcohol, formol vapor and solution, heat, picric acid, and sublimate. Stained in various ways these show variations in size from 6.3 to 30  $\mu$ . The smallest, resembling small lymphocytes, are very few. About half the cells are about 15  $\mu$  in diameter, and there are many from 20 to 25  $\mu$ . Many masses containing three to twenty or more nuclei can be seen, in which neither acids, iodine, nor stains show any separation. The protoplasm is usually pale and granular or vacuolated. The nuclei are relatively large, stain deeply, and show numerous karyokinetic figures. (See figures and explanation in the text.)

27th. Urine 380 c.cm.; dark red, clear, no albumin. The foam is yellow. Fuming nitric acid shows bile coloring-matter; there are a few cylindroids.

The patient feels more comfortable. The scleræ and skin show slight icterus. The abdomen is still above the level of the ribs. The superficial veins are plain, but not distended. The abdominal wall is tense. There is resonance in front to the pubes and on the right side, dulness in the left side (on which the patient lies). Palpation negative on account of tense wall. Liver-dulness from the sixth to the eighth interspaces in the nipple-line. Œdema in the back as before. The hands were swollen early this morning, but are not now.

At 1 P.M. the patient vomited immediately after eating some bread and milk.

There is diminished resonance in the back below the left scapula, with diminished breath-sounds and vocal fremitus. Aspirated in the ninth interspace at the angle of the scapula, withdrawing 10 c.cm. of clear yellow fluid. This contains cells like those in the peritoneum.

28th. Urine 450 c.cm.; specific gravity 1023; dark green with yellow foam; marked bile-color reaction. Sediment contains hyaline casts, sometimes with yellow granules.

The jaundice as before. Liver-dulness from the fifth to the seventh interspace in the nipple-line. Abdomen tense as before. The heart is not displaced. The dulness in the left back as before; the half-moon shaped space is clear. Vomited a little mucus.

November 2. Urine 1100; specific gravity 1023; dark yellow. No albumin nor sugar. Diazo-test positive. Sediment negative. Weight 96 pounds. Patient has not vomited since the 28th. Eats a little bread and milk, corn-bread and beef-broth.

The heart is not displaced. On the left, behind, there is dulness from the fourth dorsal spine, the upper line extending down and toward the front to the ninth interspace in the middle axillary line, where there is tympanitic resonance.

In the right, posteriorly, there is dulness from the ninth spinous process to the seventh interspace in the axilla, sloping down to the liver-dulness in the mammary line. Breath-sounds and fremitus absent over areas of dulness.

Aspirated in the seventh interspace in the left axilla, obtaining 430 c.cm. of dark yellow fluid, specific gravity 1012. The foam is yellow; bile-test positive. Aspirated in the seventh interspace below the right scapula, withdrawing 220 c.cm. of paler yellow fluid, also of

specific gravity 1012. Foam white; bile-test negative. On both sides the lung could be felt as a hard body coming against the needle.

The patient, declining to remain longer in the hospital, passed under the care of my friend, Dr. P. J. Livingstone, of Caro, Mich.

The diagnosis, as given in a clinical lecture, was malignant disease, probably cancer, of the peritoneum, lungs and pleuræ, with growths either in the wall of the stomach, including the cardiac end, or else in the tissues behind it, and pressing on it; also growths pressing on the bile-ducts. The primary seat was left in doubt. The absence of definite symptoms on the part of the stomach, intestines, pancreas, and other abdominal organs made it impossible to assign the primary seat to one of them. The impossibility of examining the stomach-digestion made accurate investigation of that organ impossible. The age made it most probable the disease was primary in the intestine. Primary so-called endothelioma of the peritoneum and pleura was considered, and also a primary growth in the retroperitoneal tissue. Tuberculosis was excluded on account of the low specific gravity of the fluid and the character of the cells. A primary growth of the œsophagus or cardia was excluded.

About a week after leaving the hospital the patient died, and Dr. Livingstone obtained an autopsy. Unfortunately, an accident early in the operation compelled Dr. Livingstone to leave and prevented a complete examination, as also the obtaining of much material. Dr. Livingstone writes that the wall of the stomach was thickened all over and so retracted that its capacity was not more than twelve ounces. The thickness extended to the œsophageal opening, and was especially marked along the greater curvature. Around the cardiac end were large adherent masses of carcinomatous lymph-nodules. The pylorus was almost entirely closed. The omentum was thickened and rolled up. The intestines were involved in a mass of adhesions with the enlarged mesenteric glands. The pancreas was also involved in the new growth. The rectum and bladder were free. The right pleura was adherent to the lower half of the lower lobe of the lung. The latter was of the color and consistence of liver. The pericardium and heart were not affected. The various body-cavities contained, together, five or six quarts of fluid. There was marked jaundice.

Questions in regard to the left pleura and the diaphragm could not be answered. The only tissues saved were a section of the pyloric end of the stomach, the gall-bladder with a bit of liver, and the right kidney and adrenal with peritoneum.

The pylorus has a small ulcer extending into the submucosa. The mucous membrane around the ulcer is thickened and with the submucosa measures 5 mm. in depth. The muscularis is 3 mm. thick. Continuous with this is a firm cancerous mass 1.5 cm. thick. Four cm. from the pylorus the mucosa is 1.5 mm. thick, the submucosa 5 mm., and the muscularis 1-1.5 mm.

The gall-bladder is retracted in all directions, being 2 cm. in diameter in the widest part. The surface is covered with small yellow nodules.

The wall is from 1 to 4 mm. thick. The cavity is filled with thick white mucus. In the wall of the cystic duct, just beyond the gall-bladder, is a soft, white, roundish mass 3 mm. in diameter. Just beyond this is another mass, 1.5 cm. in diameter, obliterating the lumen in that part. Further down is a carcinomatous lymph-nodule, and beside this an infiltration which passes into the liver, with the veins. The peritoneum over the kidney and adrenal is from 2.5 to 5 mm. thick, filled with yellowish nodules or coalescent masses of considerable size.

*Microscopical examination.* Pylorus: the ulcer mentioned above extends into a scirrhus mass. The remains of the mucosa show for the most part a granulation-tissue filled with large cells with deeply staining irregular nuclei. Tubules are rare. The cells in them usually grow irregularly, filling the lumen. At the bottom of the mucosa are long oval alveoli, lined by irregular cylinder-cells, the deeply staining nuclei of which are toward the walls of the alveoli. A few nuclei show traces of karyokinetic figures. There is no basement-membrane in these alveoli. The walls of the alveoli are made up of connective tissue with few long and narrow nuclei, and are sparsely infiltrated with small round cells. The submucosa contains a few small alveoli lined with polymorphous cells, but for the most part shows an extensive infiltration with shrunken cells in small spaces. In the muscularis are large areas filled with cells which have large, pale vesicular nuclei and very little protoplasm. These spaces sometimes show very thin lines of connective tissue traversing them in various directions, so forming alveoli. Beneath the muscularis are large and small alveoli, the walls of which are of dense connective tissue. They contain atrophic cells.

Near the pylorus the mucosa is still cancerous. The tubules do not show, but are replaced by a granulation-tissue containing epithelial, small, round and multinuclear cells and long spindle-cells. At the bottom of the mucosa are irregular alveoli, lined with irregular or cylindrical cells in a single or double layer, or irregularly filling the lumen. Cells with small nuclei and swollen protoplasm of fine granular or homogeneous appearance are sometimes present in the alveoli. Some of the alveoli are lined by long cylinder cells with small, crescent-shaped nuclei close to the wall. The muscularis mucosæ here contains many alveoli, some of them passing through its whole width, of irregular outline. These are lined with a single layer of cylinder-cells, or more frequently are filled with irregular cells. Just below the muscularis mucosæ are alveoli filled with cells. These have deeply stained nuclei and a large amount of protoplasm, with round or oval outlines. The cells lie close together, so that the boundaries can only be seen by careful illumination and focussing. The cells are retracted from the walls of the alveoli. In some alveoli all the cells have relatively small nuclei and clear, swollen bodies. There are areas of multinuclear cell-infiltration in the submucosa, and extensive large-celled infiltration in the lymph-spaces. The muscular fibres are separated by alveoli filled with epithelial cells, with thin septa in the larger alveoli. There are also a few alveoli lined with a single layer of cylindrical or cubical cells and containing mucus-looking material in the centre. Just beneath the peritoneum are alveoli lined with cubical cells. A few free cells in the alveoli show mucous degeneration. In some the nuclei show evidences of recent cell-division. Furthest away from the pylorus the mucosa shows tubules for the most part of normal appearance, though the cells

are, as a rule, more advanced in mucous degeneration than in a healthy stomach. In a few tubules the cells stain unusually deeply. This is seen especially at the bottoms of the tubules, and in some cases these tubules are prolonged through the muscularis mucosæ. The submucosa and muscularis show cancerous change similar to that in other parts already described.

The wall of the gall-bladder contains numerous small alveoli just beneath the serosa. The large mass described is a carcinomatous focus containing alveoli with very thin septa, and with cells resembling those of the other parts already described. The folds of the mucous membrane of the gall-bladder and cystic duct are filled with cancer alveoli. There are also foci of small-celled infiltration. The cancerous tissue passes into the liver along with the large vessels, and is found, also, in portal areas, some distance from the surface.

The peritoneum over the right kidney and adrenal contains large alveoli filled with the characteristic cells. There is also much small-celled infiltration. The veins of the peritoneum are much distended.

This was evidently a case of cancer of the stomach primarily. That the disease began in the pylorus is impossible to prove, though highly probable. At all events, widespread infiltration or multiple new growths occurred, so that the whole stomach-wall was early involved, followed later by metastasis in the peritoneum and pleuræ.

This view is based on the character of the growths and their distribution. It is hardly necessary to exclude a primary so-called endothelioma of the peritoneum, as the growths here do not go out from the endothelial cells, as in the other disease. The early infiltration of the whole wall gave the local disease the character of a latent cancer, while the affection of the cardia produced the striking symptom of obstruction there.

The case presents two aspects of especial interest: the youth of the patient and the physical and microscopic characteristics of the fluid in the peritoneum and pleuræ.

AGE. It is not necessary to speak at length on the first point. Since the publication of Mathieu's<sup>1</sup> classical article, in 1884, it has been admitted more generally than before that cancer of the stomach can occur before the age of forty or even thirty, once looked on as the earliest possible periods. A number of cases have been reported by trustworthy observers. Many are published in so casual a way that enumeration and analysis are out of the question. One fact of importance that seems to be demonstrated by recent observations is that cancer of the stomach in early life often has a slow course. This was brought out when, in the Société médicale des Hôpitaux, March 10, 1895,<sup>2</sup> Mathieu reported the case of a man of twenty-five years, who died of cancer of the stomach, whose symptoms began three years before. Catrin men-

<sup>1</sup> Mathieu, Marc: Du cancer précoce de l'estomac. Paris, 1884.

<sup>2</sup> La Semaine médicale, 1895, p. 225.



tioned another case lasting two or three years. Ferrand spoke of a case with slow development in a young girl, but the diagnosis was not so positively made as in the others. [Puncture of the enlarged liver withdrew a "juice manifestly cancerous."]

The present is the second case of gastric cancer in early life I have seen in which a positive diagnosis was made. In the other case there were classical symptoms in a woman of twenty-four years. A year later my colleague, Dr. B. E. Hadra, operated on account of complete obstruction of the pylorus, and we found the disease (scirrhus) limited to a ring including the pylorus, and only six centimetres wide at the widest part. There was no evidence of cancer in the lymph-nodules removed with the mass.<sup>1</sup> The matter of slow course is important because of the growing and proper tendency to look on cancer of the stomach as a surgical disease. It would be permissible to make a bolder attempt at complete extirpation of all diseased parts in a young person than in the usual subjects of gastric cancer.

It is hardly necessary to speak of the diagnosis of cancer of the stomach in early life, except to repeat the remark of Boas that the diagnosis is difficult because in young subjects cancer of the intestine is more frequent. Of course, in youth, as later, the cancer may be latent, or there may be early involvement of the whole wall, so obscuring the diagnosis or making it difficult.

**THE EFFUSION.** The transudate in the case now reported belongs to the fatty variety, the peculiarities and causes of which were first accurately shown by Quinke.<sup>2</sup> In the present case the milky appearance was due to fatty degenerated cells and free fat-globules from those cells. As this can occur in conditions so different as tuberculosis and cancer it evidently has only limited diagnostic value.<sup>3</sup>

The low specific gravity of the fluid, as in my case, is usually looked on as characteristic of cancerous as distinguished from tuberculous exudates. The latter are usually of high specific gravity—from 1022 to 1025, in my experience. But sometimes a cancerous effusion has a high specific gravity. In a case of carcinoma of the pleura secondary to one of the stomach, with fatty fluid, Bögehold<sup>4</sup> found the specific gravity of the fluid was 1021 to 1023. [There was considerable free

<sup>1</sup> Since this paper was written I have received the report of the post-mortem examination, confirming the diagnosis made in another case in my clinic, in a woman of twenty-one years. Symptoms were present nine months; tumor was discovered six months before death. Operation was declined. Cancer of the pylorus was found, apparently without metastases.

<sup>2</sup> Ueber fetthaltige Transudate. Hydrops chylosus und Hydrops adiposus. *Deutsches Archiv für klin. Med.*, Bd. 16, p. 121.

<sup>3</sup> As the quantity of fat extracted with ether was so small it is possible the opacity was due in part to some other substance than fat. Rotmann, in a valuable article (*Zeitschrift für klin. Med.*, Band xxxi. p. 438) quotes G. Lion, who found a casein-like substance as the cause of a milky ascites. Hammersten in a similar fluid found a mucoid body.

<sup>4</sup> *Berlin. klin. Wochenschrift*, 1873, No. 24, p. 347.

blood in this fluid.] Quinke, in two cases of cancerous fatty ascites, also found a specific gravity of 1023. On the other hand, in tuberculous ascites the specific gravity may be as low as 1015. So the specific gravity of effusions must be used with caution in diagnosis.

THE CELLS. For the last fifty years the belief in a characteristic cancer-cell has slowly changed as objective criticism stripped away each attribute thought to be peculiar. At present there is little left but the unfulfilled hope that a cell-parasite may be found, by the recognition of which we may distinguish cancer-cells from others. Peculiarities of form or size, the presence of vacuoles, especially of large vacuoles, fat-granule-cells (especially these last two when in considerable number), cells containing glycogen, have all been abandoned on account of the uncertainty accompanying their application. So careful a clinician as Eichhorst still makes use of some of these things, however. In the latest edition of his *Lehrbuch der klin. Untersuchungsmethoden*, Berlin, 1896, he says, "Especially in cancer of the pleura we find in the exudate, not rarely, abundant fatty-granule cells and cells with multiple nuclei, which are characteristic of cancer." Geigel and Voit speak with more caution, but much to the same effect (*Lehrbuch der klin. Untersuchungsmethoden*, Stuttgart, 1895). But most observers hold that only the recognition of distinct tumor-particles can be used in making a diagnosis of new growth of the serous membranes. The finding of such particles is, of course, not common. It was, therefore, a matter of great interest when Rieder<sup>1</sup> reported a case in which he made a diagnosis of malignant disease of the peritoneum and pleura from finding numerous cells in the exudates showing indirect nuclear division. The patient was a woman of forty years. "Section showed sarcoma (carcinoma?) of the peritoneum, probably secondary to malignant disease of the ovaries." In the fluids obtained during life cells were found which were remarkable "in the first place, on account of the differences in size and shape of the individual cells. Often there were indentations and constrictions, sometimes buddings. In many cells there were one or many vacuoles, often so large that the nucleus was pushed to one side, sometimes hardly visible. The nuclei varied in size and number." The examination of the stained cells showed large numbers of cells showing indirect division, and especially cells with atypical mitoses.

Rieder fully described and accurately figured these cells. His description should be consulted in the original by those interested, being too detailed for quotation here. I have found some interesting forms that he did not, and, on the other hand, he describes some forms I did not get to see. Thus, I did not see such beautiful multilobed cells as he shows, but I seem to have seen more of the atypical mitoses.

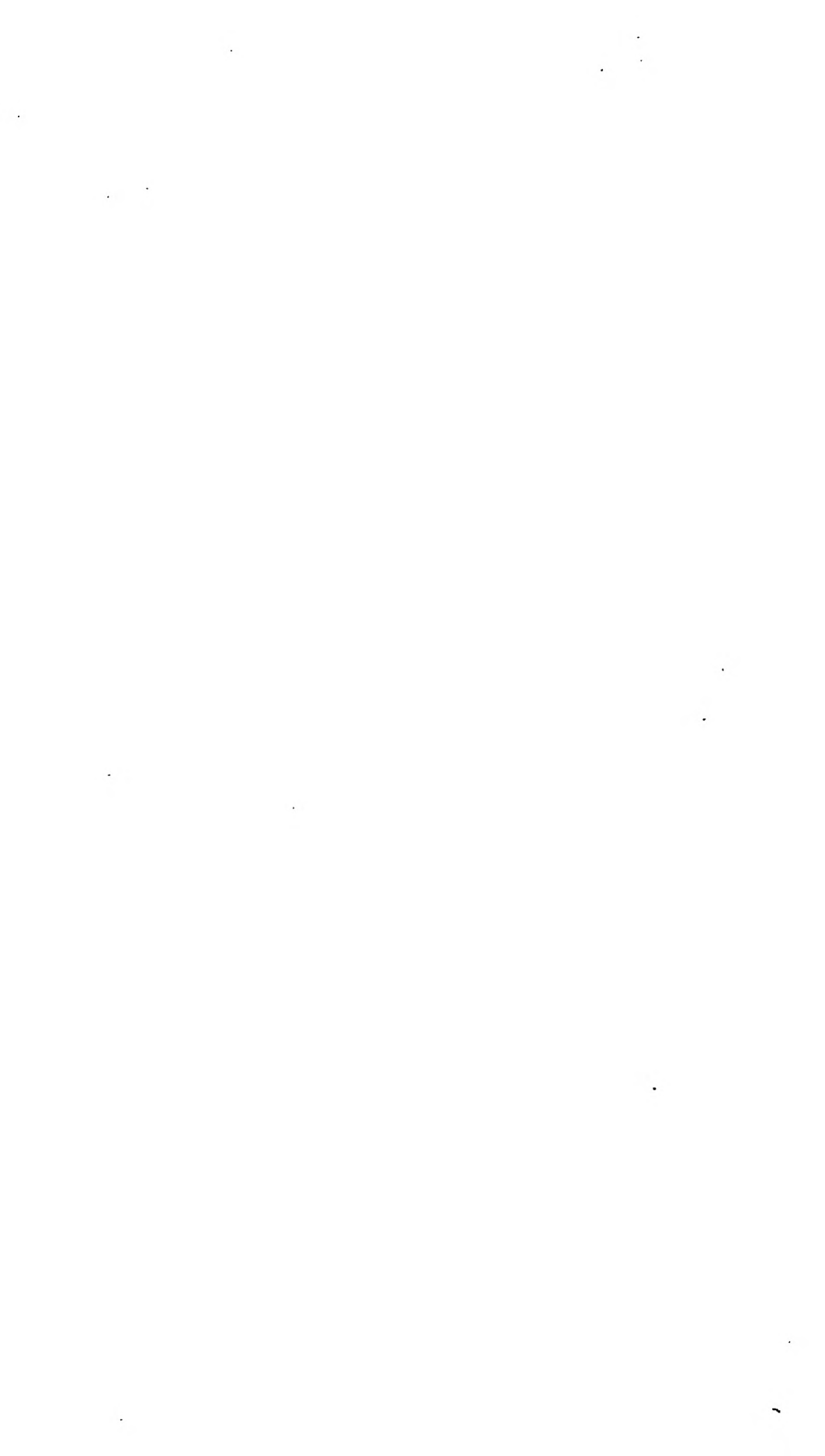
<sup>1</sup> Deutsches Archiv für klin. Med., Bd. liv. H. 6, p. 544.

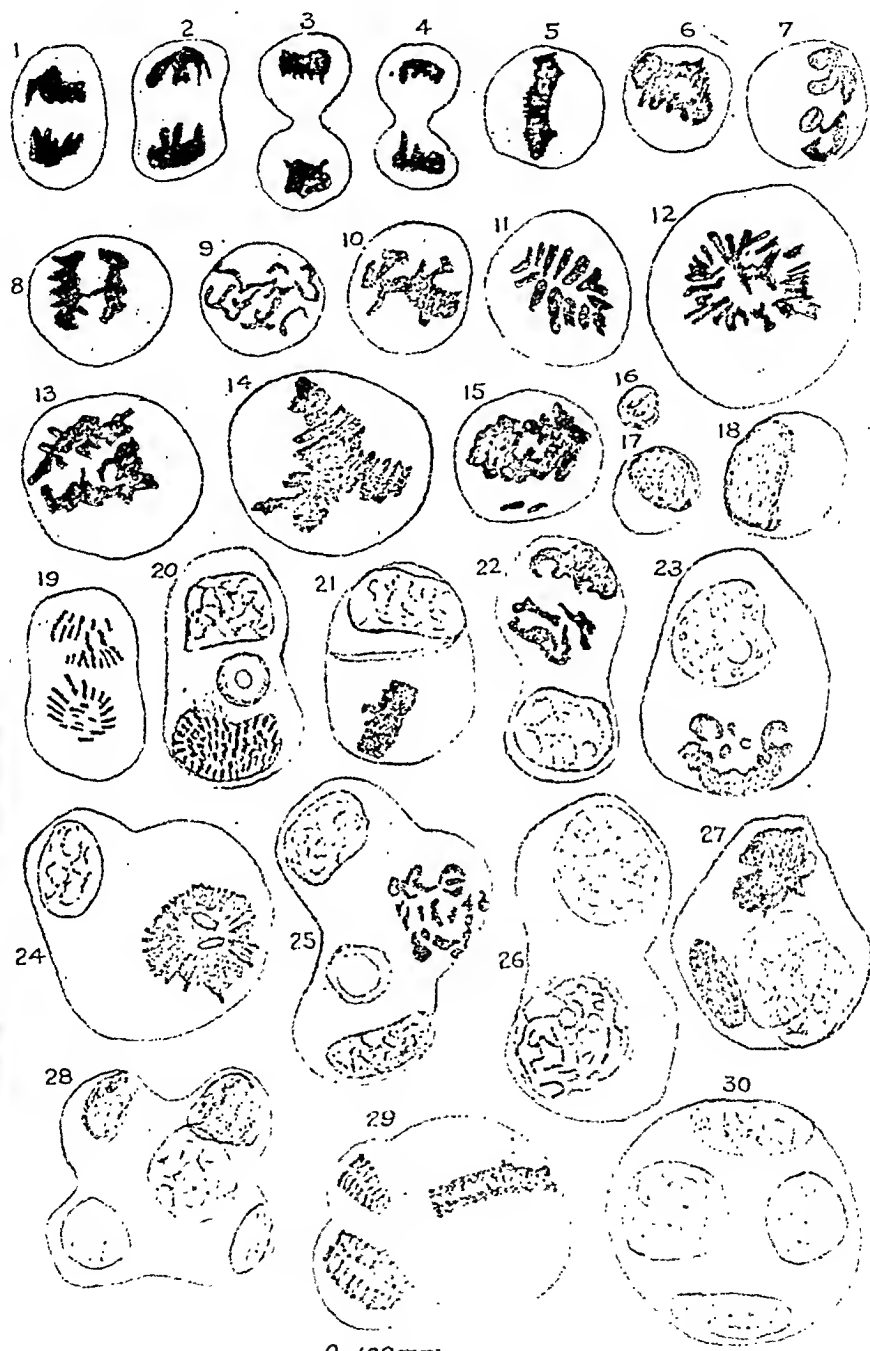
Incited by the excellent article of Rieder, I began to examine exudates and transudates more carefully than before, but the case now reported was the first one I encountered in which I obtained positive results. Other cases examined in the meantime were non-malignant.

I proceed to a description of the cells. After fixing, the preparations were stained in various ways. The best results were obtained by the use of dilute hematoxylin solutions, especially after hardening in picric acid.

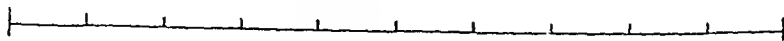
Cells having the size and appearance of lymphocytes are but rarely found (Fig. 16). Multinuclear leucocytes are also very uncommon. The fatty-granule cells that were so numerous in the fresh sediment appear after fixing as in Figs. 17 and 18. In these the nucleus stains with moderate intensity. It is usually finely granular or striated, sometimes shows a fine network, and rarely a nucleolus. The nucleus in these, as in other cells, sometimes contains small vacuoles (Fig. 23). The protoplasm is either finely granular or homogeneous, or, in cells suitably fixed, shows the fatty granules. The protoplasm does not take eosin well; with Ehrlich's neutrophile mixture it shows very fine neutrophile granules thickly filling the cell. [In the figures the protoplasm has been shaded without any attempt at a reproduction of the structure.] The vacuoles show well in stained preparations. They do not give the microchemic reaction for mucin with thionin or hematoxylin. They rarely reach a size larger than  $25\ \mu$  in diameter, and vacuolated cells such as Quincke and others describe, 100 to  $120\ \mu$  in diameter, I did not find at all. There are many bodies looking like giant-cells or aggregations of cells. Some are undoubtedly single cells with many nuclei, and I show some of the smaller ones in Figs. 24-30, 43-45. Others contain as many as twenty nuclei, but it is not possible to be certain these are not small cell-nests. However, in the fresh sediment they could not be separated by pressure on the cover-glass, nor could any boundaries be shown by silver nitrate. The latter test, however, on cover-glass preparations is very uncertain. The cells shown in Figs. 21 and 39 show incomplete division of the protoplasm. Occasionally cells showing a similar condition with three or four parts can be found.

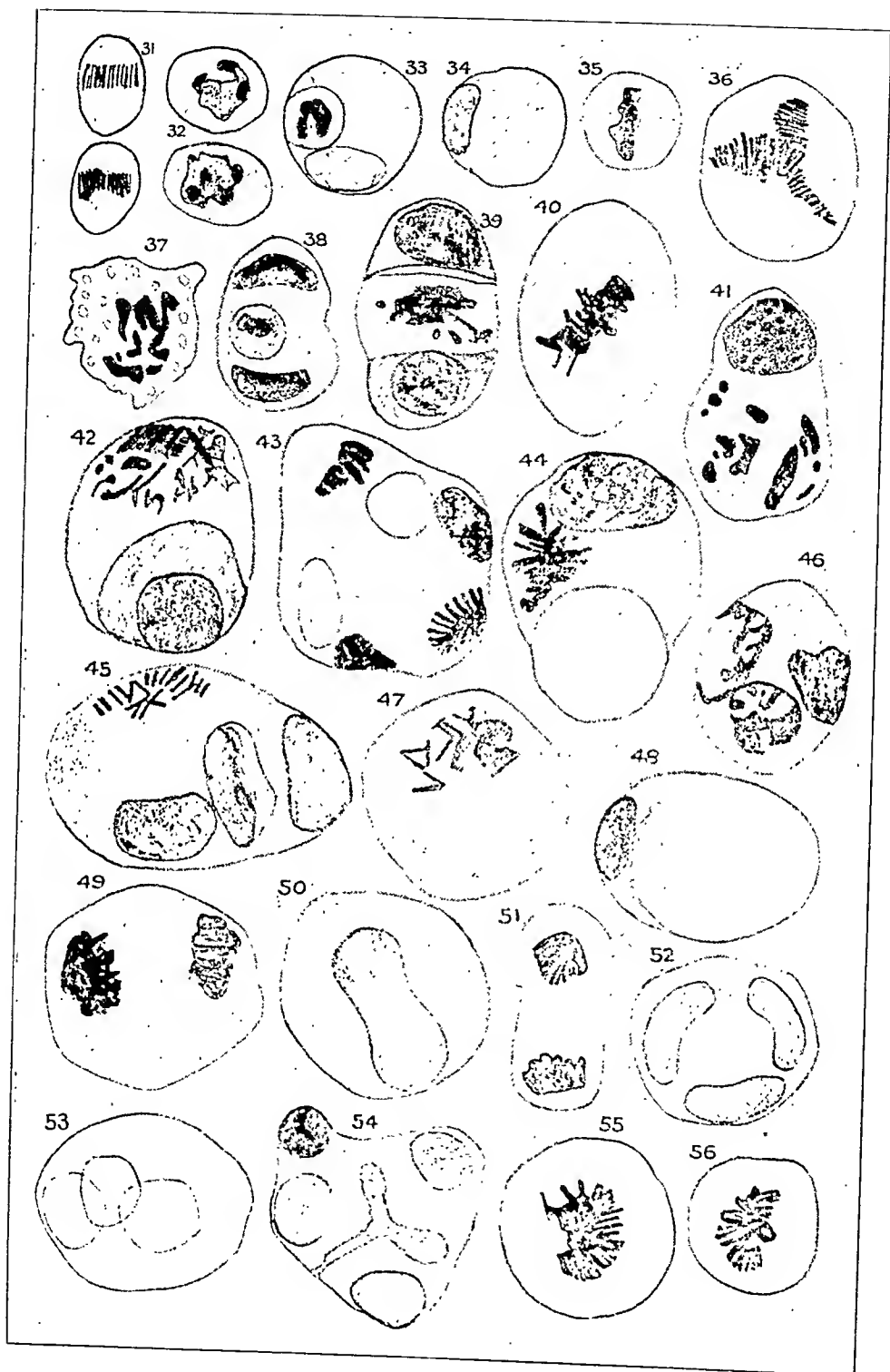
The most remarkable feature of the sediment is presented by the great number of karyokinetic figures. These are especially common in cells from 12 to  $18\ \mu$  in diameter. The protoplasm of these cells is usually more homogeneous than that of others. Vacuoles sometimes occur, and in rare cases the protoplasm may be very much degenerated. Mitoses are so numerous that every field contains one or more. Often two to five can be seen in a small field. Various stages of nuclear and cell division are present. The most common is that of the equatorial plate, as shown in Figs. 5, 6, 11, 15, 21, 27, etc. The spireme (Figs. 9 and 26) and the monaster (Figs. 24 and 44) are uncommon. The meta-





0.100mm.







phase is not so easily recognizable, partly on account of the obscurity of many of the figures, but is well shown in Fig. 29. The anaphase is common, as in Figs. 1-4, 8, etc. The chromatic figures in about half the examples are fairly typical, or show such modifications of size and shape of the chromosomes as can be explained by slight alterations or the mode of preparation of the specimen. Chromatic figures are also found in larger cells, but having the same kind of protoplasm as the smaller one just mentioned, and hence not enlarged as the result of degeneration. These reach a diameter of  $28\ \mu$ . Cells of all sizes, but especially the larger ones, sometimes show atypical mitoses. Thus, Figs. 14 and 36 show tripolar nuclei. The nuclei in Figs. 12 and 13 may be atypical, but in the absence of polar bodies and achiromatic figures they are difficult to interpret.

Cells containing more than one nucleus, and with the nuclei in different stages, are also common. Some of these are shown in Figs. 20-27, 39, 41-45. Many other varieties of these could be given. In these cells one or more of the nuclei are in the resting stage, and one or sometimes more in various stages of indirect division and sometimes showing an atypical figure. The cells in the pleural transudate resemble in all respects those found in the peritoneum, as a few figures will show (Figs. 31-45).

The mitoses found, so far as they can be studied by the chromatin alone, show all the common abnormalities. Thus we find hyper- and hypochromatic nuclei, the latter being rare. Giant mitosis may be represented by the tripolar figure in Fig. 14. Asymmetrical mitosis is not easy to recognize on account of the imperfect preservation of the chromosomes in many cases. The examples of mitosis in multinuclear cells resemble often the figures given by Krompecher.<sup>1</sup>

The finding of the mitotic figures in the ascitic and pleural fluids may be considered from two separate aspects, viz., the great number of these in the first place, and the presence of atypical forms in the other. I shall consider the last first.

The interesting history of atypical mitosis can only be touched on here. Eberth<sup>2</sup> was the first to describe division into four parts, but his statements were at first discredited by Flemming and Strassburger. Later, however, Arnold<sup>3</sup> found multiple karyokinesis in carcinoma. He thought the process might result in the production of polynuclear cells. Since then a great deal of work has been done on the subject, much of it being excited by the ingenious speculations of Hansemann. From an examination of the work done so far it appears that atypical mitoses are found in various pathological conditions, not only in new

<sup>1</sup> Ueber die Mitose mehrkerniger Zellen und die Beziehung zwischen Mitose und Amitose. Arch. für path. Anat., Bd. cxlii, p. 447.

<sup>2</sup> Archiv für path. Anat. und Physiol. Bd. lxxvii.

<sup>3</sup> Ibid., Bd. lxxxiii.



growths like cancer and sarcoma, but also in benign tumors and in regenerations; in short, "in all tissues of strong reproductive activity and when there is active mitosis (Ströbe)." They are also found in tissues irritated by various poisons, such as quinine, chloral, nicotine, etc., or in tissues exposed to high temperature (Galeotti). In cancer all observers find them in great richness and variety, but the view that the presence of even a large number of pathological mitoses in a tissue justifies the diagnosis of cancer is gradually being abandoned.<sup>1</sup>

As regards the occurrence and importance of mitotic figures in exudates and transudates, I can find nothing in the literature except the article of Rieder. I have endeavored to control his findings and my own, as far as I was able, by examining other similar fluids in the same way. The results are interesting, but, of course, much more research is still necessary.

I find that in ordinary serous effusions, as in serous pleurisy and tubercular peritonitis, the large majority of cells are multinuclear leucocytes. There are also few or many small cells having the characteristics of lymphocytes, a few larger, mononuclear, cells usually with small vesicular nuclei, and in some cases fibroblasts. My examinations in such fluids, therefore, give the same results as were obtained by E. Grawitz<sup>2</sup> in his investigations on the formed constituents of pleural exudates. Cells like the smaller forms in mitosis in my own case are not found in such exudates. The larger cells in my case do not have their counterparts in ordinary exudates. As I surmised they might be endothelial cells from the peritoneum and pleura, I obtained bits of the former tissue at operations on the abdomen, made cover-glass preparations of scrapings, and examined these after treating them as I had the sediments. In this way, from normal peritoneum and from the apparently normal peritoneum in tuberculosis of that membrane, cells may be obtained which resemble in form, size, and structure of nucleus and protoplasm the larger cells in my case of cancer, but without mitoses. From the inflamed appendix vermiformis I obtained similar cells, also with resting nuclei, but the cells on inflamed surfaces are often smaller than those from similar parts in health. From the normal serosa I obtained cells apparently showing amitotic division. These are more numerous on the inflamed peritoneum or pleura, and I figure one of the

<sup>1</sup> Although I have not thought it necessary to give a detailed review of the subject of atypical mitosis, I should add that a study of the literature will be very helpful to those who wish to make investigations in effusions. As all the literature is quoted in the indispensable works of Hansemann (*Arch. für path. Anat.*, Bd. cxix. p. 299, Bd. cxxiii. p. 356, Bd. cxxix. p. 436; *Studien über die Spezifität, den Altruismus und die Anaplasie der Zellen*. Berlin, 1893), Ströbe (*Beiträge zur path. Anat.*, Bd. xi., xiv.), Cornil (*Journal de l'Anat. et de la Physiol. norm. et path.*, 1891, t. xxvii. p. 97), and Galeotti (*Beiträge zur path. Anat.*, Bd. xiv., xx.) it is not necessary to give a complete bibliography here.

<sup>2</sup> *Charité-Annalen*, xviii. Jahr., p. 265.

most striking examples (Fig. 50) from the latter. Several similar specimens, as also some showing later stages, were seen.

In two cases I found cells more like the peculiar forms in my case of cancer.

One of these was a woman of fifty years. A cancerous mamma, with extensive metastases in the axilla, had been removed. A few days after the operation effusions came on in both pleural cavities, with adhesive pericarditis. Femoral phlebitis then developed, apparently from an old leg ulcer, and about two weeks after the operation the patient died. The pleural effusion was examined the second day after it began—*i. e.*, after the disappearance of friction. It was turbid, contained an excess of red blood-cells and lymphocytes, large numbers of multinuclear and a few endothelial cells. The latter showed fatty degeneration, breaking down of the protoplasm, with the formation of small blebs on the edges, and small and large vacuoles. Many of the large cells contained multinuclear cells in vacuoles, a process seen very rarely in the case of McK. (Fig. 33). Some of the larger cells contained two or three or more nuclei in the resting stage. Some of these cells showed partial division of the protoplasm (Fig. 54). Besides these there were a few cells, about two or three in each preparation, showing karyokinesis. These cells are from 20 to 25  $\mu$  in diameter, and resemble the larger forms found in the case of McK. The figures are fairly typical, the chromosomes preserved better than in McK. (Figs. 55, 56.)

The body of this patient was examined post mortem by Dr. A. S. Warthin. He found under the pulmonary pleura a few small, puckered nodules. To the naked eye the pleura was intact. Microscopic examination showed these to be small-celled scirrhus foci immediately beneath the pleura, the latter being intact.

In another case pleurisy developed in a young man some weeks after removal of a diseased appendix. Symptoms previous to the appearance of the pleurisy made it seem probable there was a subphrenic abscess, but as the patient left the hospital before death the exact relations could not be made out. The fluid from the pleura was slightly turbid, specific gravity 1024, and gave a growth of streptococci. It contained large numbers of pus-cells and red blood-corpuscles; many small endothelial cells up to 18  $\mu$  in diameter, with well-preserved protoplasm; larger cells up to 30  $\mu$  in diameter having normal protoplasm; most of these larger cells contain either two or more nuclei in the resting stage (Figs. 52, 53), or a single nucleus in direct division (Fig. 50); a few of the smaller specimens (20  $\mu$  in diameter) show karyokinetic figures, but the larger ones (25–30  $\mu$ ) are found with them more frequently (Figs. 46, 47, 49, 51). Finally, there are cells with the protoplasm occupied by a single large vacuole, the nucleus usually pressed to one side (Fig. 48). These cells measure as much as 55  $\mu$ . The nuclear

figures are sometimes difficult to interpret, but, on the whole, are more regular than those of McK.

It seems, then, from the few cases examined, there are more cells showing mitosis in cancerous effusions than in those of simple or tuberculous inflammation. There may also be many atypical mitoses in the former case. The examination of the last case mentioned shows that the differences are quantitative and not qualitative. This is what we should expect from the knowledge we have of karyokinesis, normal and pathological, in tissues. From the results obtained by Rieder and myself it should often be possible to make a diagnosis, especially between cancer and tuberculosis of a serous membrane, by an examination of the cells in effusions. The results in the last case show that all other differences are less reliable than this one. I do not speak of inoculations. Aside from risk of failure, the element of time may be important.

It is interesting to speculate on the origin of the larger cells found. These can hardly be other than endothelial. In Rieder's case and my own such cells are often in mitosis. This would seem to be the result of an irritation of the serous membrane, but an irritation that is not peculiar to malignant new growths, as my last case shows. We cannot, therefore, hope to determine the precise histological character of a growth on such a membrane from isolated cells from it. The fact is interesting in connection with the old view that in cancer of serous membranes the cells of the latter become infected, and so take part in the new growth, an idea of course now abandoned.

In all my cases I have examined the fresh sediment for possible parasites, hoping that a considerable experience with many parasitic protozoa would be of assistance. I could see nothing, however, suggesting such organisms. I looked with especial interest for the *Leydenia gemmipara*, described by Schaudinn in cases of cancerous ascites, but without success. In stained preparations inclusions are not uncommon, but nowhere do they suggest definite forms of parasitic organisms.

Explanation of the figures: All the cells were drawn with the camera lucida, using a Zeiss one-twelfth inch oil-immersion objective, No. 2 eye-piece. The scale is shown on Plate 1 by 0.100 mm. drawn from a standard scale under the same conditions. The outlines of the cells and nuclei are as accurate as possible. Peculiarities of the protoplasm have not been reproduced, in order to avoid confusing the picture.

Figs. 1-30 are from ascitic fluid in the case of McK.; Figs. 31-45 from the pleuræ in the same case. Figs. 46-53 are from pleurisy following appendix operation. Figs. 54-56 are from terminal pleurisy in a case of subpleural carcinoma of very limited extent. Further description of the cells is given in the text.

ADDRESS ON THE UNVEILING OF THE BRONZE STATUE OF  
THE LATE PROFESSOR SAMUEL DAVID GROSS,  
IN WASHINGTON, D.C.

By WILLIAM W. KEEN, M.D., LL.D.,  
PROFESSOR OF THE PRINCIPLES OF SURGERY AND OF CLINICAL SURGERY IN THE JEFFERSON  
MEDICAL COLLEGE, PHILADELPHIA, PA.

FELLOWS OF THE AMERICAN SURGICAL ASSOCIATION; MEMBERS  
OF THE ALUMNI ASSOCIATION OF THE JEFFERSON MEDICAL COLLEGE,  
AND FRIENDS: Go with me, your spokesman, to-day to the Wood-  
lands Cemetery—that “God’s Acre” or “Court of Peace,” as the  
Germans so poetically call it—which holds the dust of so many of the  
best dead of Philadelphia. Upon an urn there treasured you will read  
the following:

IN MEMORIAM.

Within this urn lie the ashes of  
SAMUEL D. GROSS,  
A Master in Surgery.

His life, which neared the extreme limits of the Psalmist, was one unbroken  
process of laborious years.

He filled chairs in four Medical Colleges, in as many States of the Union,  
and added lustre to them all.

He recast Surgical Science, as taught in North America, formulated anew  
its principles, enlarged its domain, added to its art, and imparted fresh im-  
petus to its study.

He composed many Books and among them

A SYSTEM OF SURGERY,

Which is read in different tongues, wherever the Healing Art is practised.

With a great intellect, carefully trained and balanced, he aimed with undi-  
vided zeal at the noble end of lessening human suffering and lengthening  
human life, and so rose to the highest position yet attained in science by  
any of his countrymen.

Resolute in truth, he had no fear; yet he was both tolerant and charitable.

Living in enlightened fellowship with all laborers in the world of Science,  
he was greatly honored by the learned in foreign lands, and deeply loved at  
home.

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Behind the Veil of This Life There is a Mystery Which He

Penetrated on the

SIXTH DAY OF MAY, 1884.

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HIS MEMORY

Shall exhort and his Example shall encourage and persuade those who  
come after him to emulate deeds which, great in themselves, were all crowned  
by the milk-white flower of

A STAINLESS LIFE.

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Who and what was the man of whom this is said?

Samuel David Gross was born near Easton, Pennsylvania, July 8, 1805, and died in Philadelphia May 6, 1884, having nearly completed his seventy-ninth year.

His early years, under the wise training of a good mother, to whose memory he rightly pays a just tribute, were spent amid the rustic labors and healthful pleasures of a Pennsylvania farm. This gave him a strong and vigorous body, without which he never could have performed a tithe of the labor which pre-eminently distinguished his long life. Before he was six years old he determined to be a surgeon, and early in his professional studies to be a teacher. Yet when he was fifteen he knew scarcely any English. Brought up among the sturdy, honest, laborious Pennsylvania Dutch, he could speak that curious English-German. But his English, of which he became so fluent a master, and even pure German, which he began to study at the same time, were learned almost as foreign tongues and as a result of his appreciation at that early age of his need for a better and wider education. Even a still more striking evidence of the early development of the innate strength of his character and indomitable will is a story told in his autobiography. While a boy he became expert in playing cards; but finding he was becoming so much fascinated by them that he replayed his games in his dreams, he resolved—fancy this in a boy not yet fourteen!—to abstain from the game for twenty years—a vow he religiously fulfilled.

At seventeen he began the study of medicine as the private pupil of a country practitioner, but after learning some osteology with the aid of that tuppenny little compend, Fyfe's *Anatomy*, and a skeleton, he gave up in despair, for again he found his intellectual tools unequal to his work. The little Latin he had was insufficient, and to understand the technicalities of medicine Greek was a *sine qua non*. "This," he says, "was the turning-point of my life. . . . I had made a great discovery—a knowledge of my ignorance, and with it came a solemn determination to remedy it." Accordingly he stopped at once in his medical career and went to an academy at Wilkes-Barre. He studied especially Latin and Greek, the latter by the use of Schrevelius's lexicon, in which all the definitions were in Latin, and Ross's grammar, constructed on the same principle. But to a master will like his even such obstacles were not insuperable. To Greek and Latin, English and German, later years added also a knowledge of French and Italian.

At nineteen he began the study of medicine again—a study in which for sixty years his labors never for a moment ceased or even relaxed.

In 1828, at the age of twenty-three, he took his degree in the third class which was graduated from the Jefferson Medical College. He opened an office first in Philadelphia, but soon removed to Easton. Nothing is more characteristic of the man than that, while waiting for practice,

he spent hours daily in dissecting in a building he erected at the back of his garden, and provided himself with a subject by driving in a buggy all the way from Easton to Philadelphia and back with a gruesome companion; wrote a work on descriptive anatomy, which, however, he never published, and in eighteen months after graduation had translated and published Bayle and Hollard's *General Anatomy*; Hatin's *Obstetrics*; Hildebrand on *Typhus*, and Tavernier's *Operative Surgery*—works aggregating over eleven hundred pages. His motto was indeed "*Nulla dies sine linea*." His "stimulus," he himself says, "was his ambition and his poverty."

In 1833, five years after his graduation, he entered upon his career as a teacher—a career which continued for forty-nine years, till within two years of his death. This took him first to Cincinnati as Demonstrator of Anatomy in the Medical College of Ohio. Those of my audience who left Cincinnati yesterday will be amused to learn that by stage, canal, and primitive steamboat it took him thirteen days to reach the Queen City; and all of you will admire the pluck and courage of the young man when I add that his total worldly goods on reaching there were one hundred dollars in his purse, a wife and two children in his family, but also in his breast a heart ready to grapple with any difficulties and determined to conquer them all.

In 1835 he became Professor of Pathological Anatomy in the Cincinnati Medical College, where he was a colleague of Daniel Drake, Willard Parker, and James B. Rogers, one of the famous four brothers, with a second of whom—Robert E.—he was later a colleague in the Jefferson.

His book on the *Bones and Joints* had appeared in 1830, and next, as a result of four years' study and teaching, his *Elements of Pathological Anatomy* was published in 1839. It is strange to think that in a then small Western town in America a young teacher in a new medical school should have published the first book in the English language on Pathological Anatomy. No wonder, then, that it brought him fame and practice; that its second edition made him a member of the Imperial Royal Society in Vienna; and that, thirty years afterward, Virchow, at a dinner he gave to its then distinguished author, should show it as one of the prizes of his library.

In 1840 he went to the University of Louisville as Professor of Surgery, and, excepting one year when he was Professor of Surgery in the University of the City of New York, he remained there for sixteen years, happy in his family, his students, his flowers, and his generous hospitality. He and his colleagues—Drake and Austin Flint—soon made it the most important medical centre in the West, and he was in surgery the reigning sovereign. While there he published, in 1851, his work on the *Urinary Organs*, and in 1854 another pioneer work, that

on *Foreign Bodies in the Air Passages*. His fame had become so great that he was invited to the University of Virginia, the University of Louisiana, the University of Pennsylvania, and other schools. But he was steadfast to Louisville until his beloved Alma Mater called him to the chair just vacated by Mütter. From 1856, when in his Introductory he said, "whatever of life and of health and of strength remain to me, I hereby, in the presence of Almighty God and of this large assemblage dedicate to the cause of my Alma Mater, to the interest of medical science, and to the good of my fellow-creatures," till he resigned his chair in 1882—nay, till his death in 1884—this was absolutely true. Even when the shadows of death were thickening he corrected the proof-sheets of two papers on "Wounds of the Intestines" and "Lacerations Consequent upon Parturition," his last labors in the service of science and humanity.

Three years after he entered upon his duties at the Jefferson he published his splendid *System of Surgery*—a work which, though in many respects its pathology and its practice are now obsolete, is a mine of information, a monument of untiring labor, a text-book worthy of its author, and which has been the companion and guide of many generations of students. It was translated into several foreign tongues and passed through six editions, the last appearing only seventeen months before his death. That even when verging toward fourscore he should have been willing to throw aside all his strong prejudices and accept the then struggling principles and practice of Listerism shows the progressive character of his mind and his remarkable willingness to welcome new truths.

From his removal to Philadelphia till his death, twenty-eight years later, his life can be summed up in a few sentences: daily labor in his profession, editorial labor without cessation for some years in managing the *North American Medico-Chirurgical Review*, the successor of the *Louisville Medical Review*, of which he had also been the editor; article after article in journals; address after address; twenty-six annual courses of lectures on surgery to thousands of students; labors without ceasing till he wrapped the drapery of his couch around him and calmly passed away.

In reviewing his life we may fittingly consider it from the standpoint of the surgeon, the author, the teacher, and the man.

As a surgeon he was painstaking, thorough and careful in his investigation of a case, skilful as an operator, and, having so vast an experience and equally extensive acquaintance with the wide literature of his profession, he was scarcely ever perplexed by the most difficult case and rarely at a loss as to the proper course to pursue in the most unexpected emergencies.

He was a practitioner of the old school, who always mingled medicine

with surgery, and attributed much of his success in the latter to his experience in the former. In theory he sometimes clung to beliefs, which, in practice, he abandoned. In one of his later papers, "A Lost Art," and in his lectures, he still advocated blood-letting; but in the nearly twenty years in which as a student, an assistant in his clinic, and a quiz-master I saw much of his practice, I only remember two cases in which he actually bled his patients.

His influence on the profession was marked and wholesome. For many years he was almost always at the annual meetings of the American Medical Association and the American Surgical Association, was looked up to in both as the Nestor of the profession, and his papers and his wise words of counsel moulded both the thought and the action of his brethren to a notable degree. He founded two medical journals, was the founder of the Pathological Society of Philadelphia and of the Philadelphia Academy of Surgery, the founder and first president of the American Surgical Association, and the first president of the Alumni Association of the Jefferson Medical College. It is peculiarly fitting, therefore, that these last two associations should unite to-day in erecting and unveiling the bronze statue of one who did so much for them and whom they rightly delight to honor. All who knew his tall, manly figure and his fine face will agree that it is a speaking likeness, both in pose and feature. Could I only get a glimpse of the right hand which holds his familiar scalpel I would recognize the man. *Ex pede Herculem! Ex manu Gross!*

As an author, his chief characteristics were untiring industry, comprehensiveness, methodical treatment of his subject, and a singular felicity of style, especially for one who acquired English so late and with difficulty. In fact, through life his speech, by a slight, though not unpleasant accent, always betrayed his German descent.

He "blazed" more than one new "trail" in the forests of surgical ignorance. In the early part, and even in the middle of this century, it was rare for Americans to write medical books. The most they did was either to translate a French or a German work or to annotate an English one. He was one of the earliest to create an American medical literature of importance, and his works on the *Urinary Organs*, on *Foreign Bodies in the Air Passages*, and his text-book on *Surgery* gave a position to American surgery abroad which we can now hardly appreciate; while, as already related, his *Pathological Anatomy* was the very first work in the English language on that most important branch of medicine.

His experiments and monograph on *Wounds of the Intestines* laid the foundation for the later studies of Parkes, Senn, and other American surgeons, and have led to the modern rational and successful treatment of these then so uniformly fatal injuries. He first advocated abdom-



inal section in rupture of the bladder, the use of adhesive plaster in fractures of the legs, amputation in senile gangrene, and the immediate uniting of tendon to tendon when they were divided in an incised wound. Had he lived but a year or two longer bacteriology would have shown him that scrofula was of tubercular origin, and not, as he so firmly believed and vigorously taught, a manifestation of hereditary syphilis.

That his eminence as an author should have met with recognition from scientific organizations and institutions of learning is no cause of surprise. It made him the president of the International Medical Congress of 1876, a member of many of the scientific societies of Europe as well as of America, and won for him the LL.D. of the University of Pennsylvania, and I believe the unique honor in America of having had conferred upon him the highest degree of all three of the leading universities of Great Britain—Oxford, Cambridge, and Edinburgh. Indeed, it is both significant and pathetic to note that he laid down his pen just after recording in his autobiography the announcement of the honor which the University of Edinburgh intended to bestow upon him at its tercentenary celebration.

As a teacher, I can speak both with personal knowledge and enthusiasm. I can see his tall, stately form, his handsome face, his glowing features, his impressive gestures. He was earnestness itself. Filled to overflowing with his subject, his one desire was to impart to us as much of the knowledge he possessed as our young heads could hold. Repetition did not blunt the novelty nor time lessen the attraction of his theme. It always seemed as if he was telling us for the first time the new story of the beneficent work that surgery could do for the injured and the suffering. His whole heart was in his work. Especially did he inculcate the principles of surgery, for he was convinced, and rightly, that one who was thoroughly imbued with these could not go far wrong in his practice.

His own statement of one of the qualifications of a teacher is so true yet so often forgotten that, in spite of its mixed metaphor, I will quote it: "A teacher should be bold and decided in his opinions; not too positive, but sufficiently so to be authoritative. The student cannot judge for himself. The knowledge that is placed before him must be, so to speak, well digested for him; otherwise it will stagger and bewilder, not instruct him." His sense of the heavy responsibility of the teacher is well shown by the following from his autobiography: "Nothing was more offensive to me than applause as I entered the amphitheatre, and I never permitted it after the first lecture. I always said, 'Gentlemen, such a noise is more befitting a theatre or a circus than a temple dedicated not to Æsculapius, but to Almighty God, for the study of disease and accident, and your preparation for the great

duties of your profession. There is something awfully solemn in a profession which deals with life and death, and I desire, at the very threshold of this course of lectures, to impress upon your minds its sacred and responsible character, that you may be induced to make the best possible use of your time and conduct yourselves in a manner worthy of the dignity of Christian gentlemen.' ”

The value of recitations in a medical course I fully appreciate and indorse. They will occupy in the future a much larger place in our medical schools than they now do. But I am equally convinced that such a voice, such a presence, such an impressive, earnest lecturer will never lose their powerful influence nor their place in instruction.

As a man, he was beautiful in his relations with his family, who were devoted to him with an affection that was unusually strong; upright in all his dealings, and despising cant and pretence and anything unworthy a true gentleman. Few men were more widely known in and out of the profession, and few ever had the good fortune to know intimately so many distinguished people of both continents. Wherever he was known he was respected, and by those who knew him intimately he was beloved.

Such, then, was the man whom we are gathered to-day to honor. The American Surgical Association, the Alumni Association of the Jefferson Medical College, and a few friends who have gladly united with us in this service of affectionate remembrance, have presented his statue to the people of the United States, to stand forever in our beautiful capital city as a mute yet eloquent evidence of our esteem for his personal worth and his professional attainments.

It is strange that the human race has failed so grievously to recognize publicly its great medical benefactors. Mr. Lecky, in his last remarkable book, in speaking of the rewards of genius in Great Britain, after enumerating the chief of the extraordinary and beneficent achievements of medical men in the present century, says, “ England may justly claim a foremost place in this noble work, and many of her finest intellects have been enlisted in its service. In no single instance has this kind of eminence been recognized by a peerage. It is clearly understood that another and a lower dignity is the stamp of honor which the State accords to the very highest eminence in medicine and surgery—as if to show in the clearest light how inferior in its eyes are the professions which do most to mitigate the great sum of human agony to the professions which talk and quarrel and kill.” (*Democracy and Liberty*, i. 429.) And yet Jenner almost saved England from extinction, and Simpson and Lister have done far more to mitigate the terrors of surgery and the pangs of maternity, to save life, and to bring health and happiness to the human race than Marlborough and Wellington and Nelson have done to destroy life and bring sorrow and pain and rapine and misery.

It is pleasant to record that England has atoned, with the opening of this year, for such long-continued neglect. In making Sir Joseph Lister the first medical peer she has conferred less honor upon Lord Lister than upon herself.

The statue of Marion Sims, not long since erected in New York, and this one of Samuel D. Gross, let us hope, are the beginning of a similar recognition of beneficent genius in our own land. Go through the broad streets of this beautiful city, and in its circles and parks and squares you will find, with singular exceptions, only the statues of statesmen and warriors—men who deserve, we all agree, their well-won honors and immortality. But, truly, “Peace hath her victories no less renowned than those of war.” Though its heroes are not, it may be, portrayed in marble or in bronze, they are enshrined in the grateful hearts of mankind, immortal in literature, even the humblest of such toilers as the Gideon Grays and the Weellum Maclures that cheer and brighten the world.

And were the soldiers, whose statues one may see everywhere around us, the sole possessors of bravery? In 1832, that most dreaded of all scourges, Asiatic cholera, for the first time broke out all over this country with the greatest virulence. Easton was only eighty miles from New York, and the citizens, in terror lest the dread disease would reach their own town, appointed a young, intrepid surgeon to visit New York and learn what he could for their benefit. When others were fleeing in frightened thousands from the pestilence Gross bravely went directly into the very midst of it, reaching New York when the epidemic was at its very height. In that then small and half-depopulated town 385 persons died on the very day of his arrival—and he staid there a week in a hot July, visiting only its hospitals and its charnel-houses. What call you that but the highest type of bravery?—a bravery which Norfolk and Mobile and Memphis have since seen repeated by scores of courageous physicians ready to sacrifice their lives for their fellowmen with no blare of trumpets, no roar of cannon, no cheers of troops, no plaudits of the press! No battlefield ever saw greater heroes; no country braver men!

Yonder statue of Joseph Henry has stood alone for too many years. We have to-day unveiled its worthy companion. Both of them are memorials of men great in science, whose lives were devoted to the good of their fellow-creatures, to saving life, adding to human comfort, lessening pain, promoting knowledge, cheering the sick, and assuaging even the very pangs of the dying. We do well thus to honor in imperishable bronze the men who have won these victories of peace! To no one can the words of the blessed Master apply with greater force than to the kind surgeon whose time and thought and talents are given to humanity, and, above all, to the poor, with no payment but the grate-

ful look of returning health and resened life and that inward satisfaction which far surpasses all the wealth of the Orient—"Inasmuch as ye have done it unto one of the least of these, my brethren, ye have done it unto Me."

## A CONTRIBUTION TO THE SURGERY OF THE KIDNEY AND OF THE URETER.<sup>1</sup>

BY ARPAD G. GERSTER, M.D.,  
OF NEW YORK.

DURING the period beginning June 21, 1895, and ending February 1, 1897, thirteen patients suffering from various affections of the kidney and of the ureter came under the writer's care at Mount Sinai Hospital.

### *Ureters.*

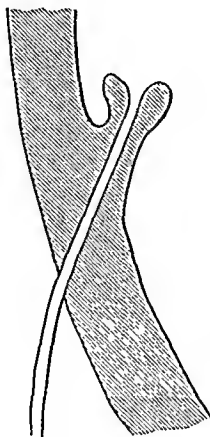
In four cases causative affections of the ureters were observed. In three of them the trouble was relieved permanently by operative procedures which were based upon the labors of Küster, Fenger, and Howard Kelly.

CASE I. *Hydronephrosis of traumatic origin; nephrotomy, followed by successful plastic of the proximal orifice of the ureter; cure.*—J. W., aged nine years, a well-developed, but somewhat emaciated boy, had sustained a severe contusion in January, 1895, while coasting on the snow. Hæmaturia followed and persisted for nearly four weeks. Much pain was complained of also, accompanied by considerable fever, which, however, abated by the end of the third week. About six months later a peculiar scoliotic posture was observed in the boy, which was found to be dependent upon the presence of a tumor located in the right hypochondrium. About two quarts of urinous fluid were withdrawn from this tumor, and the following December three pints were again removed. On January 31, 1896, the following conditions were found: in the right hypochondrium, extending well back into the loin, a large fluctuating tumor; the colon could be determined, both by percussion and palpation, situated below and in front of this tumor. The urinary examination yielded a normal result, specific gravity 1020. The liquid obtained by puncture was clear, straw-colored, and charged with urinary contents. On February 3d, chloroform being administered, the tumor was exposed by an oblique lumbar incision, whereupon, the reflection of the peritoneum being found, this was stripped up until the ureter was exposed. Now the sac was freely incised and evacuated. The attenuated substance of the kidney represented in the plane of section a crescent-like mass occupying the upper and posterior part of the periphery of this sac, having in its middle the thickness of about an inch. On the inner surface of this mass unchanged renal papillæ could be

<sup>1</sup> Read before the Society of the Physicians of the German Dispensary, New York, February, 24, 1897.

easily recognized. No sacculation of the calices was present. The proximal orifice of the ureter was very conspicuous, and was found on the anterior wall of the sac about three inches above that part which would be its bottom in the upright posture. It resembled a nipple-shaped elevation projecting about one-third of an inch into the lumen of the sac. (Fig. 1.) The everted mucous membrane of the ureter was

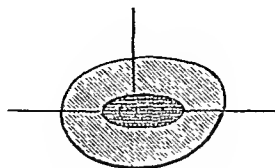
FIG. 1.



Longitudinal section of renal orifice of ureter.

thickened, hyperæmic, and bled on touch. A silver probe was arrested at about the base of this projection, but the resistance yielded to moderate pressure, whereupon an elastic bougie (No. 5, French measure) was readily passed into the bladder. By the time these facts were ascertained the boy's pulse became thready, wherefore, after being plugged, the sac was attached by a few sutures to the integument, and the wound was dressed. The boy rallied promptly on stimulation, and only moderate fever followed. During the first twenty-four hours one and one-half pints of urine were passed by the urethra. Hence, it could be assumed that the left kidney acted in a satisfactory manner.

FIG. 2.

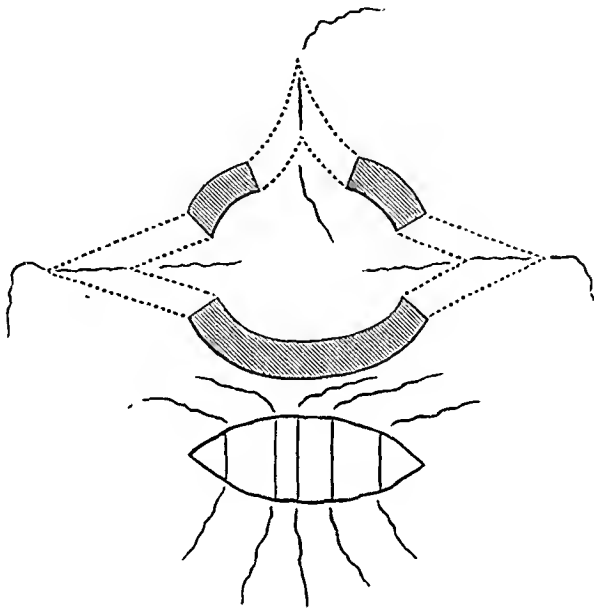


Incision of ureteral orifice.

On February 6th chloroform was administered again, and the orifice of the ureter being exposed, the following plastic operation was performed: the everted rim of the orifice of the ureter was incised on the right and on the left side, as well as in the middle of the upper circumference, the incision being carried far enough downward into the ureter to divide the stricture, also, at three points. (Fig. 2.) The upper

and lower angles of each of these rhomboidal wounds were sutured with catgut—*i.e.*, the longitudinal incisions were sutured transversely (Fenger). It became evident now that the lower portion of the projecting rim also needed a plastic correction. Accordingly a flap of mucous membrane one-third of an inch wide and three-quarters of an inch long and distant from the ureter about one-half an inch, was excised from the lining of the sac, the defect being united by five buried catgut sutures. (Fig. 3.)

FIG. 3.



Plastic of renal orifice of ureter.

By this last step the nipple-shaped prominence was converted into a shallow, funnel-shaped depression. An elastic catheter having been placed into the ureter, the wound was lightly plugged and dressed. Slight reaction followed, and blood was observed shortly after the operation in the urine voided from the bladder.

On the morning of February 7th the catheter had to be removed from the ureter on account of severe pains radiating toward the bladder and penis. On February 9th the tamponade was renewed. On February 16th the discharge became slightly purulent, with moderate fever. On account of this complication plugging was discontinued, and two stout rubber drainage-tubes were inserted, by means of which the sac was irrigated three times a day with boro-salicylic solution. At the end of each of these irrigations a small quantity of methylene-blue was added to the solution to test the permeability of the ureter. By February 20th methylene-blue staining of the urine voided from the bladder was first observed. There was moderate fever every evening until the end of February. On March 1st the gaping wound was partially closed by means of a number of silkworm-gut stitches passed through the parenchyma of the kidney, leaving an aperture just sufficiently large for the drainage-tubes.

From this time on the boy picked up gradually, leaving the bed on

symptoms of fever and retention supervened, which abated only after perforation and evacuation of the lumbar abscess. He was admitted to Mount Sinai Hospital in July, 1896. Considerable pyuria and an abscess of the prostate were found. This being incised, the pyuria still continued. Cystoscopy was impossible on account of a tight stricture of the prostatic urethra. In the left loin a very deep sinus was seen passing from the centre of the old scar downward and forward, and discharging from time to time large quantities of pus. No tumor could be felt in the hypochondrium. It was suspected that the discharge might be due to a retained ligature, wherefore the cicatrix was extensively laid open, but no ligature could be found. The large wound was packed, and as the wound was beginning to contract a remarkable variation in the amount of the discharge was observed. Whenever the sinus was discharging copiously the urine became nearly normal, but when the lumbar sinus had contracted large quantities of pus appeared in the urine. This alternation made it evident that the suppuration must be due to a diseased condition of the ureter. The wound in the perineum healed very slowly, closing by the middle of October. On November 13th we proceeded to extirpate the ureter. The most difficult portion of the task was the finding of the renal end of the ureter, which was searched for in a large cicatricial mass closely connected with the peritoneum. I decided not to work at random, but to proceed systematically, my plan being to find the reflection of the peritoneum and to follow this toward the spinal column, gradually raising the peritoneum from the cicatrix until the ureter was found. This plan proved to be successful. An oblique incision following the old scar, and continuing beyond it far enough forward, was passed through the abdominal muscles until the peritoneum was exposed in the anterior angle of the wound. This being stripped up, the posterior aspect of the descending colon became visible. Where the cicatricial mass commenced the peritoneum was dissected up with the knife carefully and slowly, the dissection progressing toward the median line. While thus proceeding, on account of the unyielding cicatricial deposit, the space became somewhat cramped, wherefore a second vertical incision, running parallel and close to the margin of the quadratus muscle, was added. This liberated the tissues to such an extent that the ureter was soon exposed. Its renal orifice was recognized by the everted hyperæmic mucous membrane. From this point on the operation became very easy. The peritoneum was stripped up along the downward course of the ureter. We found Cabot's statement beautifully verified, that on raising the peritoneum the adherent ureter would follow it. The oblique incision was further extended downward, and afterward to Poupart's ligament, care being taken to leave a sufficient muscular mass attached to the rim of the os ilium to enable us to apply an abdominal suture. Successively the psoas major and minor muscles, then the iliac vessels, were exposed, and the ureter was separated from its peritoneal adhesions. The vas deferens could not be seen. The lower portion of the ureter was found to be distended, its diameter being nearly three-fourths of an inch, its lining very tumid and strongly injected. It contained a large quantity of pus, which welled up unexpectedly, flooding the field of operation. Close to the bladder the ureter was found to be very brittle, and a continuous dissection became impossible. On attempting to pass a sound into the

bladder it was found that in close proximity to the lower orifice of the ureter a stricture existed, which, however, permitted the passage of an ordinary silver probe. The ureter was removed close to this stricture, its estimated distance from the bladder being not more than an inch. The wound was now thoroughly cleansed by irrigation, and its middle portion being closed by a dozen stout silkworm-gut button sutures, the upper and lower angles were drained and left open. The procedure had consumed about two hours, and the patient had become very weak. The small and rapid pulse did not respond promptly to energetic stimulation, and the patient's condition remained critical for forty-eight hours. Profuse sweats, continuous vomiting, cold extremities all bode evil, and could not be ascribed to loss of blood, which had been moderate, but had to be rather charged to the extensive stripping up of the peritoneum. Finally the pulse improved, the patient's temperature rising from subnormal to 101° F. Lively suppuration followed from the bottom of the enormous wound, but the drainage was adequate and the abdominal suture healed throughout by first intention. The upper angle healed first. It took about four weeks to bring about closure of the entire wound. To enable us to deal with the patient's cystitis the urethral stricture was gradually dilated, and the bladder frequently irrigated. On January 22, 1897, a cystoscopic examination was made. It was found that the orifice of the right ureter was normal, that of the left ureter being difficult to locate in the mass of hyperæmic ridges of mucous membrane. Gradually the cystitis also yielded, and the patient, formerly suffering from very frequent urination, can at present hold his water for two hours. His general condition has improved wonderfully, and he is still gaining weight. The patient was thereupon presented for inspection.

Pertaining to this subject is the observation that certain forms of pyelitis are maintained by temporary causes, which are very often relieved as soon as the pelvis of the kidney is drained through a direct incision made from the loin. A clot of blood or fibrin, or a calculus, may be the cause of such transient disturbance. In the fall of 1894 I had occasion to test this method of treatment in a case of acute pyelitis with evident retention. After maintaining drainage for about four weeks the febrile symptoms disappeared, and the drainage-tube being withdrawn the wound healed, the patient making a perfect recovery. In the following case, however, the relief was temporary only, lasting so long as the renal fistula was open :

CASE IV. *Double pyelitis, with intense cystitis; nephrotomy of the left side; temporary improvement.*—Mrs. G. Z., aged thirty-eight years, multipara, had been suffering for three years with very painful urination. The urine, voided in small quantities, was turbid and very often, toward the end of micturition, tinged with blood. For two months she complained of frequent attacks of lumbar pain. The robust woman was admitted to the hospital March 3, 1896, and her physical condition was found to be otherwise sound. On cystoscopy, according to Kelly's method, the bladder was found to be extremely irritable, its mucous membrane everywhere velvety, bleeding on touch. The trigno-



num, especially, was found to be much injected and intumescent, so that the left ureter could not be found. Catheterism of the right ureter, however, was accomplished, and twenty-eight grammes of a moderately turbid, acid urine were secured, which contained few pus- and blood-corpuscles, specific gravity being 1024. The kidneys could not be felt by palpation, but intense pain was complained of on pressure exerted over the left lumbar region. The patient voided forty-one ounces of urine from the 3d to the 4th of March. Diagnosis was made of double pyelitis, with chronic cystitis. The bladder would not hold more than two and one-half ounces of fluid during deep anaesthesia. On March 26th the left kidney was exposed. The aspirating-needle withdrew from the pelvis about two ounces of slightly turbid urine. Hence it was fair to conclude that it was somewhat distended. Along the aspirating-needle the pelvis of the kidney was freely incised, the incision being carried through the convexity. The surface of the kidney, as well as the parenchyma, appeared normal. Little reaction followed, the frequent urgency to urination becoming decidedly diminished, presumably in proportion to the reduced quantity of urine passing out through the bladder. April 1st cystoscopy was repeated, and the condition of the interior of the bladder was found unchanged. April 21st the patient was discharged at her own request, with the advice to wear a drainage-tube for several months. The disagreeable wetting of her clothing caused by the renal drainage, however, discouraged her so soon that she had the tube withdrawn by the end of May, whereupon the fistula closed within a very short while. There was a strong suspicion of tuberculosis, which, however, could not be confirmed, though frequent search for Koch's bacilli was instituted. Inoculation of a rabbit with the urinary sediment yielded also a negative result.

#### *Echinococcus of the Kidney.*

It is well known that the kidney becomes very rarely the seat of hydatids. Statistics show that the left kidney is about twice as often attacked as the right. The literature of the subject, comprising over three hundred recorded cases, contains only one instance of calcification of the sac. In Simon's case (No. 6) partial calcification is mentioned, whereas in this, our case, the entire sac was calcified throughout.

*Echinococcus of the right kidney; hydatids voided by the urethra; exposure of the large tumor; incision and evacuation of the contents of the calcareous sac; secondary extirpation of the concremental shell; cure.*—Mrs. E. D., aged twenty-six years, was presented by Dr. Steudel, of Seymour, Conn., June 19, 1895. The delicately built, small woman was pregnant in the sixth month, and stated that up to within three months she had felt entirely well, with the exception of a dull and heavy feeling she had observed to exist in the right hypochondrium for about seven years, which, however, had caused her no serious inconvenience. She said that eight years ago, while serving in a place in Germany, she had to feed regularly a number of dogs. A fortnight ago she was attacked by severe renal colic while voiding urine, and she observed that toward the end of micturition a number of grape-like bodies passed away from her. A collection of these bodies was shown to me,

which I immediately recognized as secondary hydatids. Dr. Steudel also found a considerable tumor in the right loin, which on examination was found to be smooth, unusually resistant, non-fluctuating and immovable. It extended downward in the right hypochondrium to the level of the navel, but was not influenced by the respiratory movements. Corresponding to the lowermost portion of the mass a smaller, knob-like, softish projection could be felt, which was very tender on pressure. By percussion it could be ascertained that the tumor extended upward to the level of the seventh rib posteriorly. Moderate nightly elevations of the temperature were observed, on account of which circumstance I advised an operation. Being admitted to the hospital, her daily quantity of urine was found to be 1430 grammes. It contained neither albumin, pus, nor sugar. All other organs were found normal. On June 21st, the patient being chloroformed, the tumor was exposed by an oblique lumbar incision. Now it became evident that the knob-like projection found on the lower circumference of the mass consisted of about two-thirds of the normal kidney, upon the upper pole of which, and connected with it, rested the large ovoid tumor, having the shape and size of a small cocoanut. The attempt to puncture the tumor failed because a stout needle could not be forced into it, breaking off. Finally, with considerable trouble, a square aperture was cut into the bony investment of the tumor by means of a stout resection-knife. Besides a small quantity of turbid serum, the cavity contained nothing but a closely packed, nested mass of hydatid membranes, enclosed in a large outer membrane. All this material being scraped out with a sharp spoon, it was seen that the rough, bone-like shell was bleeding wherever scraped, hence it became clear that it was organized. The oozing was so considerable that it became necessary to plug the cavity and to dress the wound. It may be added that the sharp spoon encountered everywhere the same resistance that an osseous cavity would offer to it. The place of communication between the hydatid cyst and the pelvis of the kidney could not be found.

The operation was borne very well; but in the course of the next week it became more and more evident that the cavity had not the slightest tendency to collapse and to diminish. It was clear that as long as the hard shell remained closure of the wound could not be expected. In Simon's case a number of small, bony plates were expelled, having apparently sloughed away. In this our case, however, we had to deal not with a rudimentary formation of small detached osseous plates, but with a complete bone-like capsule of extremely hard material, which, as we saw later on, varied in thickness from between one-fourth to one-half of an inch, and was well vascularized everywhere. Hence it was not probable that spontaneous expulsion would occur. As it is well known that the outer sac of echinococcus-cysts enters into intimate connections with all the organs of the vicinity, extirpation of the sac is rightly considered one of the most difficult undertakings, and was condemned as improper and inadmissible by Simon. In spite of these considerations the contingencies of the case seemed to

point urgently to the necessity of extirpation, which, with the consent of the patient, I determined to carry out.

On July 15th she was accordingly chloroformed. The operation was an exceedingly difficult, troublesome, and laborious one, both on account of the deep and inaccessible situation of a large part of the osteoid sac, and on account of the serious complications which had to be encountered in the shape of the invasion of both the pleural cavity and the peritoneum. Two of the lower ribs had to be excised, and even then the removal of the closely adherent calcareous masses was very difficult, and blunt dissection inapplicable. The edge of the knife had to be used throughout. When the pleural cavity was widely opened alarming cyanosis and heart-failure set in. The pleural defect was quickly plugged, and artificial respiration was instituted. After about five minutes the patient's condition had improved so far that the operation could be continued. It was found that, just as on the pleural side, so toward the peritoneum the sac had incorporated the serous membrane, and that a large portion of the peritoneum had to be taken away. As soon as the mass was detached from the peritoneum the defect was closed with a catgut suture. The irregular-shaped, calcareous shells composing the entire capsule were of different sizes, the largest one measuring over 7 cm. in both directions; but most of them were much smaller and were connected along irregular lines by short and dense connective tissue, resembling the lines of cranial sutures in an infant's skull. Finally, after about two hours' hard work, all the calcareous masses were removed. The wound was packed and the patient brought to bed. Considerable collapse followed and had to be combated by frequent stimulation, recurring from time to time unexpectedly, so that considerable vigilance had to be exercised. Finally, on the third day, the pulse was steadier and the patient's face lost the pinched look. On July 19th the packings were removed from the main cavity, and it became evident that this had contracted very considerably. The pleural packings were removed on July 21st, and from this date on progress was steady and rapid until the middle of August, when the patient aborted, but this did not retard her recovery long. Her general condition improved steadily, and the large cavity contracted rapidly, so that the patient could be discharged cured, August 22d. Professor Simon mentions explicitly that in his case (No. 6) the extruded plate-like mass contained osseous tissue. In our case Dr. Schwyzer, pathologist of the German Hospital, found only calcareous matter. The remarkable collection of potsherd-like concretions presented vividly recalls the shape of infantile cranial bones. The patient, also presented, is now perfectly well. On palpation the kidney can be felt connected with a resistant mass resting above it, which undoubtedly consists of shrunken cicatricial tissue.

*A Plea for an Earlier Performance of Nephrotomy in Acute Inflammatory Conditions of the Kidney.*

In the year 1890 a young woman was admitted to Mount Sinai Hospital with rebellious and rather profuse hæmaturia, which was evidently of renal origin. No traumatism, no acute malady had preceded, and the hemorrhage had persisted three weeks before the admission of the

patient, who presented the signs of considerable exsanguination. Her spleen was not enlarged, the quantity of urine normal, its composition altered only inasmuch as it contained a great deal of blood and a few pus-corpuscles, which probably came from the vagina. Every evening slight elevations of the temperature were observed, and the left kidney was rather sensitive both on pressure and spontaneously, and sufficiently enlarged to be felt on palpation. I thought of the possibility of tuberculosis, calculus, or of a neoplasm of the kidney. A number of attempts were made to influence the hemorrhage by internal medication, but were ineffectual. Finally the condition of the woman became so alarming that I decided to explore the kidney. Accordingly nephrotomy was done. It was found that the organ was considerably enlarged and turgid, and that the capsule was extremely tense. The kidney-fat was oedematous. Punctures yielded a negative result. The capsule was incised along the entire convexity, whereupon the parenchyma of the kidney bulged out somewhat. The capsule was strongly adherent, and the surface of the kidney marked by a number of punctate and stellate hemorrhages. By an incision carried through the convexity, the pelvis of the kidney was opened, and, the left index-finger being introduced into it, the entire circumference of the organ was examined bimanually. No stone and no appreciable tumor were found, and the pelvis gave the sensation of a normal mucous membrane. A drainage-tube was introduced, through which large quantities of bloody, urinous serum were discharged. It was noted that the urine voided by the urethra contained much less blood the day after the operation, and in the course of the next ten days the blood-staining of the urine disappeared entirely. The local and general disturbances also disappeared, and a fortnight later the drainage-tube was withdrawn, whereupon the wound healed rapidly. I had occasion to see this patient in the year 1893, when she told me that she had been perfectly well ever since her last illness. According to these facts, tuberculosis, neoplasm, and calculus could be positively excluded, it being evident that we had to deal with a form of acute nephritis accompanied by great tension. The hyperæmia gave rise to capillary hemorrhage, which was relieved by the drainage and relaxation of tension afforded by nephrotomy.

Within the last few years similar experiences have been noted by other surgeons, and finally there appeared in *The Lancet*, in its issue of January 4, 1896, a communication by Reginald Harrison, in which the indication for the performance of nephrotomy is extended to some forms of acute albuminuria which are accompanied by swelling and tension of the kidney. The following lines of thought will appear very natural to the surgeon who is accustomed to see the deleterious influence of great tension and infectious retention on various glandular organs. Every form of glandular inflammation, whether produced by purely chemical or microbial, and through them indirectly also chemical, influences, is accompanied by pronounced disturbances of the circulation, which manifest themselves through the presence of hyperæmia, stasis, exudation, and tension. It is well known how favorably the initial stages of these conditions are influenced by a free incision, which

relieves tension. Especially noticeable is this where glandular tissues are enclosed in a stout capsular envelope, as, for instance, the testicle, the submaxillary and parotid glands. In the case of the testicle and submaxillary salivary gland infection and excessive tension may lead to total necrosis, as can be seen in angina Ludwiggii and in cases of so-called spontaneous gangrene of the testis. As far as the final result is concerned, it is not different whether the infection entered through the secretory ducts or through the circulation by embolism.

Very similar must be the conditions in the kidney. Total, embolic necrosis of the kidney, however, is an extremely rare occurrence, there being only one case (Friedlander's) on record. The circumstance is explained by the large size of the renal artery. But the destruction of multiple circumscribed areas of the organ is a common observation. And where the integrity of the kidney is attacked through chemical influences circulating in the blood we see that the secretory apparatus of the organ is primarily attacked. If the invasion is a general one, we see that the disturbance is followed in its highest degrees by marked diminution in the urine, which becomes bloody and charged with albumin, or finally by total and fatal suppression. Very often, in the primarily non-fatal cases, lasting damage is done. The destroyed secretory elements are not only not restored, but their continued disappearance will finally culminate in uræmia. Furthermore, the modifying influence of purely mechanical interference with the normal circulation of the kidney by valvular lesions of the heart, or of a vicarious congestion due to sudden disability of the other kidney, through traumatism, operation, or morbid processes, will also have to be considered. Finally, as before stated, we have to mark the difference between forms of nephritis characterized by rapid and extensive destruction noticeable to the naked eye, and processes of degeneration which affect only the finer structure of the kidney. The questions which present themselves upon the basis of these reflections are: *First*, Will the relief from tension afforded by early nephrotomy and drainage exert a favorable influence upon the initial stages of acute infectious processes of the kidney, which otherwise would lead to suppuration? *Secondly*, Will nephrotomy exert a curative influence if it is performed during the initial hyperæmic stage of certain forms of infectious, non-suppurative nephritis, which have a tendency to lead to ultimate loss of the specific function of the organ, and are not relieved by internal medication?

Before answer is attempted to these questions we have to examine what danger is involved in the performance of the operation of nephrotomy. We know that the relative danger of nephrotomy is directly proportionate with the extent of the renal damage. Tuffier (Duplay et Reclus, *Traité de Chirurgie*, tome vii.) gives a rate of mortality for nephrotomy performed in non-infectious cases of renal calculus of 6

percentum; while in cases of pyonephrosis the rate for the same operation is 23.3 per cent. Other authors have arrived at similar figures. My own statistics, embracing twenty-one nephrotomies, contain only one case of death following this operation, and in this case, as we shall see, the cause of death was really not dependent upon the operation. From this we see, then, that nephrotomy can be considered a comparatively safe operation. As a purely technical problem, nephrotomy is known to every surgeon to be, under ordinary circumstances, a simple and easy procedure. The hemorrhage unavoidably encountered is trifling and easily controlled, and the hemorrhage caused by the incision of the renal tissue itself, though profuse at first, is also easily checked by packing. Should one or more of the larger branches of the renal artery, traversing the septa, be injured, the slight pressure exerted by a good pack will always control the bleeding.

Let us return now to the questions which we have raised. To answer it in a categorical fashion, it is necessary to ascertain the degree of the injury sustained by the renal structures in each given case. The physical and chemical aids at our disposal are extremely valuable and important, but cannot yield the result that is gained from a systematic search made through the parenchyma of the kidney itself by the microscope. I consider Fenger's advice, to avail ourselves of each opportunity afforded by a nephrotomy to remove a segment of the kidney for microscopical examination, extremely useful. No harm is done to the patient, and more definite and precise information is gained regarding the actual condition of the kidney than from the examination of the urine alone, which occasionally leaves us in the lurch altogether. Momentous changes, as, for instance, capillary embolism with consecutive infarction, the presence of pathogenic microbes in the primary urinary channels, desquamative processes, and shrinkage of the glomeruli and canaliculi, can be positively recognized. In case of recovery their former existence cannot be gainsaid. As to the questions themselves, these answers can be given:

First, in all forms of suppurative inflammation of the kidney the surgical principle of early and extensive incision, to relieve tension and to afford drainage, is to be maintained with the same strictness and emphasis as it is accepted for all cases in which the suppurative focus is enclosed in rigid envelopes, capsules, fasciæ, or the periosteum. If a timely incision is not made, increasing tension will inevitably end in the death of the tissues. What we are accustomed to do without hesitation in phlegmonous affections of the subaponeurotic tissues of the palm, in suppurations of the bursæ, of the submaxillary and parotid glands, of the joints, and in acute infectious osteomyelitis—*i.e.*, a free incision, should be done just as unhesitatingly in suppurations of the kidney. The objection that the diagnosis is difficult on account of the deep situation of the organ

is not new. It had to be met, and was swept aside when the pathological conditions just mentioned were clearly recognized. With our ability to diagnosticate deep-seated suppurations at an early stage the hesitation formerly felt has disappeared. It is undoubtedly true that in some of the most destructive invasions of the kidney, as, for instance, in ascending septico-pyelonephritis, or in multiple embolic nephritis, one or another or several of the important physical diagnostic signs may fail. But by skilfully excluding all other organic disturbances, and in the presence of grave and threatening danger from suppression, the surgeon's action will be determined by weighing all the apparent circumstances. One of the most important and reliable signs of a serious involvement of the kidney is local pain on pressure. But even this symptom may be occasionally absent, as will be seen from the case published by Dr. Howard Lilienthal, in *Annals of Surgery*, March, 1896, Case No. 3. The patient in question was operated on in the surgical division of Mount Sinai Hospital. The history is as follows:

Four weeks after an acute osteomyelitis of the upper jaw, treated by extensive incision and the extraction of a sequestrum, the course of healing having been complicated by an attack of erysipelas, suddenly high fever developed with a rigor, accompanied by exquisite lumbar pain of the right side. The urine was normal, except that it contained a trace of albumin, and micturition was painless. Guided by the lumbar pain, Dr. Lilienthal incised, on May 5th, a cortical abscess of the right kidney. The sepsis continuing, another abscess was found on May 20th by an exploring-needle, and was also incised. At this time the urine was still free from pus, containing only a trace of albumin and a few blood-corpuscles, together with a few granular casts. The sepsis still continued, the patient losing ground visibly. He was delirious and somnolent. On July 10th I examined the patient with Dr. Lilienthal. He was extremely emaciated, and presented the features of the gravest septico-pyæmia. A thorough examination of all the internal organs evinced nothing positive. No pain on pressure could be found anywhere. In spite of this, and on account of the absence of other organic changes, I advised a renewed exploration of the right as well as an incision of the left kidney. Accordingly, on July 23d, Dr. Lilienthal incised in both kidneys a number of cortical abscesses. The patient recovered and was discharged cured September 29th.

We had in this instance a very encouraging example of the utility of surgical procedure in a case of multiple embolic suppuration of both kidneys, an affection which heretofore was considered absolutely hopeless. On the other hand, it is very questionable whether the most energetic measures will be of any use where the multiplicity of suppurative foci virtually amounts to a complete destruction of the organ. This condition is comparable to the infiltrating, diffuse phlegmon of a limb, in which the most thoroughgoing and extensive incision cannot lay open every focus of infection, and where the danger to life can be eliminated

only by an ablation of the entire organ. This remark refers to a late stage of the infection. Different, however, is our standpoint when we assume that by an early and extensive incision this very destruction may be prevented. At any rate, it is proper that this interesting and important question be submitted to a thorough test. Assuming that the rapid extension of the destructive process can be modified and checked by an early incision, this procedure assumes a truly conservative value. The rapidity with which the kidney may become compromised can be estimated from the following history :

*Chronic cystitis ; acute parenchymatous nephritis with miliary abscesses ; nephrotomy ; nephrectomy ; cure.*—Mrs. S. S., aged thirty-four years, was admitted December 13, 1896. Had had two children, and stated on admission that she had been suffering from painful micturition for two years. Her strangury was so intense that occasional catheterism was necessary. On December 7th, shortly after a catheterism performed by her family physician, she suddenly felt an intense, cutting pain in her left loin, which was followed by a violent chill and high fever. Each paroxysm was accompanied by retching and vomiting. The lumbar pain was growing steadily worse, radiating toward the bladder and left thigh. On admission a temperature of 104° F. was found. A continuous desire to urinate tormented the patient, even when the bladder was empty. Her pulse was small, very frequent ; her integument bathed in perspiration, and in the left loin an exquisitely painful tumor could be felt, which was overlapped by the colon, and was evidently the left kidney. During nine hours which preceded the operation she voided thirteen and one-half ounces of urine, which was alkaline, had a specific gravity of 1022, contained a trace of albumin, a few pus-corpuscles, but no blood. She was chloroformed as soon as I had seen her, and the enlarged kidney was exposed. It was observed that a considerable quantity of watery serum escaped from the fatty envelope of the kidney, which was œdematous. The surface of the kidney appeared to be deeply congested. As soon as the capsule was incised the parenchyma bulged out. When the cortex was incised no blood was seen to flow, but turbid, bloody serum was escaping. Several punctures of the kidney were made, until finally a cavity, evidently the pelvis, was found, from which also a dark-brown bloody serum was withdrawn. Using the needle as a guide, the pelvis of the kidney was freely incised, the incision penetrating from the convexity. While a finger was dilating the deeper part of the incision a resistant band of tissue gave way. This was followed by extremely profuse arterial hemorrhage, which, however, was easily checked by firm plugging with iodoform-gauze. To encourage secretion the kidney was separated everywhere from its fatty envelope, and was surrounded with gauze compresses. Then the wound was dressed.

The only change observed was the disappearance of the acute pain, but retching and the high fever remained, though not so intense as before the operation. When the dressing was changed on December 14th the absence of that copious sero-sanguinolent discharge was noted which is seen regularly to follow nephrotomy. The same observation was made during the following three weeks. Nineteen and one-half ounces of



urine were voided on December 15th. It was alkaline, containing few pus- and blood-corpuscles, a trace of albumin, and had a specific gravity of 1024; strangury unchanged. These observations made it extremely probable, not only that the secretion of the diseased kidney was remarkably scanty, but also that its ureter was occluded. Otherwise much blood would have descended to the bladder. On December 20th the deep packings were removed from the kidney. Renewed arterial hemorrhage compelled us to replace them immediately. Some pus also escaped, but its source could not be ascertained. The quantity of urine passed by the urethra had increased, December 16th, to forty, December 20th, to sixty ounces, and its reaction had become acid. No blood was found in it at any time before January 7th. With continuing fever and vesical pain the condition of the patient became gradually and steadily worse. Several larger and smaller abscesses had broken through into the drainage-channel, and it became evident that the patient would succumb unless the kidney were removed. Accordingly on January 7th this was done. The day preceding the operation sixty-two ounces of urine were voided, hence we concluded that the other kidney was acting in a satisfactory manner.

During the nephrectomy the following facts were observed: the volume of the kidney had shrunk to about the normal standard. Its parenchyma had a waxy pallor. In the lower portion of the kidney an abscess containing about two ounces of pus was found. Separation of the vessels and ureter was very difficult on account of their extreme shortness. One of the ligatures slipped after the kidney was cut away, and the tremendous hemorrhage was controlled by a large clamp. The wound was packed and treated by the open method. The patient bore the operation very well. By January 11th there was a marked diminution of the fever noticeable, and the daily quantity of urine, which had fallen from sixty-two ounces to twenty-six ounces after the operation, arose from twenty-eight ounces on January 11th to seventy-one and one-half ounces on January 12th, which remarkable rise was undoubtedly induced by copious draughts of water. The urine contained much blood the day after the operation. From this day on recovery went on uninterruptedly. The last ligature came away on January 29th, and February 4th the larger part of the wound was closed by secondary suture. At present the patient is expecting her early discharge. It may be added that the strangury ceased immediately after the nephrectomy. The urine is at present acid, abundant, and contains nothing abnormal except a slight trace of albumin. The pathological report on the specimen is as follows:

*Diagnosis.* Acute parenchymatous nephritis, with embolic abscesses; incipient purulent nephritis.

Glomeruli partly normal, partly atrophic; in the latter case the capsule is filled with granular material; the epithelium congested; the canaliculi show granular degeneration; nuclei do not accept staining. The epithelium is swollen and necrotic; everywhere between the canaliculi round-celled infiltration, without increase of the connective tissue. Vessels appear to be normal, with the exception of the smaller capillaries, which are clogged with a large number of small cocci, probably staphylococcus. The cocci become beautifully visible by staining with Löffler's solution. Inside of the canaliculi there are also groups of short rods, which take the Löffler stain. Everywhere in the cortex are small,

but well-defined agglomerations of degenerated white blood-corpuscles, which can be accepted as miliary abscesses.

Nephrotomy was performed in this case six days after invasion, but the destructive process was not checked by it, nor could the infectious material accumulated in the kidney be drained away in an effectual manner. Had nephrotomy been done twenty-four or forty-eight hours after invasion, would it have been otherwise?

*Fulminant and fatal case of double ascending gonorrhœic nephritis* deserves to be described here on account of its rarity:

J. J., aged ten years, acquired gonorrhœa while crossing from Europe in the steerage of a transatlantic steamer. The disease became manifest on April 30th, when he arrived. On May 15th difficulty of micturition and fever set in. May 22d—*i. e.*, eight days before his admission to the hospital—violent lumbar pain of both sides was complained of. Three days previous large quantities of pus were voided by the urethra, followed by some blood. After that continuous high fever prevailed; the secretion of urine becoming gradually diminished, and finally scanty. On admission, on the evening of May 30th, the following facts were observed: the patient somewhat cyanosed, somnolent, covered with perspiration; his extremities cold; temperature 101.4° F., pulse 130; copious purulent discharge from the urethra, from which there escaped at short intervals, involuntarily, bloody, turbid urine in small quantities; the urine charged with pus, albumin, and blood; alkaline; its specific gravity 1030. The following morning I found, in addition to the facts just related, both kidneys perceptibly enlarged and palpable, especially so the right one, which was exquisitely painful to touch. The amount of urine voided during the entire night was *eight ounces*. In spite of this desperate condition I determined to incise both kidneys. After the administration of a small quantity of chloroform to produce primary stupor, the right kidney was rapidly exposed. Its fatty capsule was found very œdematous, the kidney itself enormously enlarged and tense. When the cortex was deeply incised there was no hemorrhage. The parenchyma appeared dusky, almost brown, and mottled with a large number of gray spots. It was extremely brittle, discharging turbid, reddish-brown serum. The same kind of serum escaped from the pelvis. A large drainage-tube was slipped into the opened kidney, and the wound was packed. On account of failing pulse incision of the other kidney was desisted from. The patient rallied from the collapse, but his previous condition remained unchanged. The amount of the urine continued to diminish, until the suppression became absolute. The boy died twenty hours after the operation, with a temperature of 105° F. The minutes of the post-mortem examination, made by Dr. Mandelbaum, the pathologist, on June 1st, read as follows:

Both kidneys very much enlarged, especially so the right one, which seemed to be increased to double the normal volume; the left kidney was much congested, containing in its lower portion an abscess which held 4 c.cm. of the pus; the right kidney converted into a mass of innumerable abscesses varying from the miliary to the size of a cherry; capsule strongly adherent; the cortex much thickened. In stripping off the capsule a large number of subcapsular abscesses were exposed; the lower

half of the kidney occupied by a large disintegrating clot; the ureters normal, with the exception of the lower thirds, which are much congested; vesical walls considerably thickened; vesical mucous membrane everywhere hemorrhagic; the prostate much enlarged, strongly congested, and containing a nearly empty abscess-cavity, which still held 2 c.cm. of pus. Slide-preparations of pus gained from the kidneys contained multitudes of staphylococci and gonococci. The blood-serum and serum-agar cultures of the same pus yielded colonies of gonococcus and staphylococcus albus. The pus from the prostate, however, yielded only staphylococcus albus. Cultures made from the urethral discharge remained sterile, probably because they were taken shortly after the escape of some urine. Microscopic sections of both kidneys gave evidence of unmistakable pyelonephritis, and showed luxuriant colonies of gonococcus and staphylococcus by means of Löffler's solution. Gonococci were in every instance decolorized when treated by Gram's stain.

In the presence of such an extraordinary invasion of both kidneys little can be expected from any therapy instituted at a late period of the disease. I wish to emphasize the opinion that when both kidneys are attacked simultaneously in a very virulent manner the indication for energetic action seems to be most urgent, and that much more ought to be done than heretofore in this field, scarcely cultivated by any surgeon. The same indication presented itself in another case during the period of time comprised in this paper, but my urgent wish to interfere was frustrated by the resistance of the patient:

*Repeated nephrotomy for pyonephrosis; relapse; nephrectomy; suppression; death.*—J. W., aged thirty-five years, had been operated on by me for calculous pyonephrosis in May, 1893, at the German Hospital. Two stones were removed, and the patient was discharged cured. On February 23, 1895, the same operation was performed a second time at Mount Sinai Hospital by Dr. Lilienthal, who also evacuated much pus and removed one stone from the kidney. The patient again recovered, and the wound healed. The patient was readmitted February 24, 1896. He stated that his old pains had recurred in the lumbar region, with high fever, chills, and vomiting. Strangury and augmenting pain drove him to the hospital, where a considerable tumor was found occupying the left loin, with a temperature of 100.6° F., and alkaline urine, which contained much albumin, pus, phosphates, and hyaline casts. The daily quantity of urine was fifty-one ounces. The right kidney could not be felt, nor was deep pressure exerted upon the right loin painful. February 27th the bladder was emptied and irrigated, preparatory to a cystoscopic examination, which, however, could not be carried out on account of the occurrence of a severe chill. March 2d, under chloroform, the old scar being incised, the much-enlarged left kidney was exposed and opened. It consisted of a thin-walled bag, composed of a number of communicating cavities distended by pus, many of these cavities still containing stones. As the organ had become manifestly useless it was immediately removed. Hemorrhage was very moderate, and the patient rallied well from the operation. During the following night very little urine was voided (eleven ounces in sixteen hours), becoming more and more scanty. The patient was apparently failing.

His pulse was very rapid; the temperature 104.6° F.; the skin covered with a clammy perspiration. My proposition to relieve the right kidney by a free incision was firmly declined, and the patient died March 4th in a comatose condition. No post-mortem could be had, but the right kidney was withdrawn through the existing wound, and was found in a state of purulent pyelonephritis, which seems to have existed for some time.

It is proper for me to make this remark that, had I been content with simply incising for a third time the left kidney, the patient's life would have been probably prolonged.

How little can be expected from simple nephrotomy in the presence of a multiple suppuration of the kidney can be seen from the following case:

*Tumor of the kidney with pyuria; nephrotomy and evacuation of five renal abscesses, each containing a stone; closure of the wound; recurrence; nephrectomy of the calculous kidney; cure.*—Mrs. J. V., aged forty years, multipara, admitted June 8, 1896, stating that she had suffered from persistent hæmaturia five years ago, which, however, ceased spontaneously. A year ago she had sharp renal colic, accompanied by fever and vomiting. Shortly after this pus was detected in the urine. Micturition was never painful. Since four months continuous pyuria and noticeable emaciation existed. Dr. Alfred Meyer found a lumbar tumor, and sent the patient to me. On admission a large, dense, non-fluctuating tumor was found in the right loin, which protruded into the hypochondrium, displacing the colon downward and forward. The urine was abundant, acid, had a specific gravity of 1016, and contained large quantities of pus and some albumin. June 10th, through the cystoscope a normal, pale vesical mucous membrane was seen. Furthermore, it was observed that on gentle massage of the right groin a cylindrical plug of pus escaped from the right ureter, the orifice of which appeared much congested. The left ureter appeared normal. Into this a catheter was introduced by means of Kelly's procedure. Sixteen grammes of urine were collected, that contained a few pus-corpuscles and traces of albumin. Hence it was concluded that the left kidney, though not perfectly sound, was not seriously involved.

June 15th the right kidney was exposed and freely incised. From the pelvis and from four calices large quantities of pus and several irregular shaped uratic stones were removed. The kidney and wound were drained in the usual fashion and dressed. Little reaction followed. The secretion diminished rapidly, and patient was discharged July 18th with a nearly closed wound. Her general condition had improved noticeably. October 7th she presented herself again, reporting that the wound, which had been closed for several weeks, had reopened a week ago, discharging a large quantity of pus. I found the lumbar tumor smaller than it was before the first operation, painless to touch; the general condition of the patient was very good, her urine acid and abundant, but containing much pus. I advised the removal of the kidney, which was done October 22, 1896, without accident. The kidney was found to contain six more abscesses, each harboring a stone. The renal parenchyma looked waxy, and was very much shrunken. By October 27th the urine became nearly normal, though still containing microscopical

quantities of pus. November 20th the mass-ligature of the pedicle came away, and December 15th the patient was discharged, cured.

The presence of morbid changes in the other kidney should not prevent nephrectomy of a totally disorganized organ. On the contrary, the removal of such a pus-bag as was encountered in this case eliminates a continuous menace to the other moderately diseased kidney.

Resembling in many respects the preceding one, the following case was nevertheless much more serious, on account of the extreme marasm caused by a renal suppuration of ten years' standing :

*Calculous pyelonephritis of the right side; cystoscopy; nephrectomy; cure.*—E. W. A., aged thirty-eight years, merchant, was admitted October 13, 1896, having come from the South. He stated that twelve years ago internal urethrotomy had been performed for rebellious gleet and stricture. This was followed by an acute cystitis, which had persisted ever since that time. He suffered for ten years, more or less, from periodical attacks of severe renal colic of the right side, which were accompanied by chills and bloody urination. In spite of a ravenous appetite the patient had emaciated to a skeleton. Since ten weeks his urine had become putrid, and from that time on continuous fever, frequent chills, night-sweats, and incessant lumbar pain, radiating toward the bladder and the right testicle, were present. Urination was very frequent. The physical examination showed excessive emaciation and light anasarca of the feet; otherwise normal conditions; an accelerated pulse of good quality. In the right loin a large, sensitive, resistant tumor could be felt, which descended to the level of the navel, and extended to the median line. The urine was foul, but acid, containing much pus, some blood, and very large quantities of detritus; its daily quantity was about fifty ounces; the temperature 100.2° F. in the morning, with regular evening exacerbation. October 14th cystoscopy was done. The trigonum was found to be moderately congested, especially around the orifice of the right ureter, from which a solid plug of pus was seen escaping. From the left ureter clear urine was seen escaping at short intervals. Catheterization of this ureter was not attempted. The left kidney could not be palpated. The assumption was fairly justified that the left kidney was sound. October 15, 1896, the patient being chloroformed, the tumor was exposed and easily separated from its lateral adhesions. It represented a thin-walled sac from which the aspirator removed foul pus, and within which a number of stones could be distinctly felt. The cortex appeared waxy. A mass-ligature was placed around the pedicle and the organ was ablated. The wound was dressed in the usual manner. During the first twenty-four hours following the operation fifty ounces of urine were voided, which was nearly clear. It had a high specific gravity, containing a small quantity of pus and a little blood. From October 18th the temperature became normal. The urine continued to be abundant, and the patient's general condition, aided by his enormous appetite, was rapidly improved, so that on November 15th he could return to his home cured, having gained since the operation thirty-four pounds in weight.

CONCLUDING REMARKS. The surgical principle, to afford timely relief from tension, and early to evacuate after an early diagnosis, made

in the presence of acute suppurative processes threatening the integrity of an organ, must find unreserved application in suppurations of the kidney. The earlier such measures are taken the more they deserve to be called truly conservative—that is, directed toward the preservation of the functional ability of the viscus. Nephrotomy done in the early stages of renal suppuration is a safe procedure, and ought to be done much oftener than heretofore, the indication being based upon the presence of suppurative fever, a renal tumor, and especially upon the voiding of a decreasing daily quantity of urine.

Secondly. As far as the indication is concerned for the performance of nephrotomy in the presence of acute non-suppurative forms of nephritis, Reginald Harrison strongly recommends early interference whenever, in the presence of an infection, albuminuria and appreciable painful renal intumescence can be demonstrated, from which the presence of increased renal tension can be deduced. He published in the issue of the *Lancet* of January 4, 1896, three successful cases of nephrotomy performed, respectively, in a case of scarlatinal nephritis, in one caused by influenza, and in another one following exposure to weather. These suggestive facts are mentioned here only to serve as a stimulus to further endeavor.

### *Neoplasms of the Kidney.*

During the period comprised within the limits of this paper the kidney was twice successfully removed for neoplasms. Unfortunately in one of the cases relapse followed:

CASE I. *Alveolar sarcoma of the right kidney; extirpation; cure; relapse.*—D. G., aged five and a half years, was admitted June 13, 1896, to Mount Sinai Hospital. Her mother stated that the child had commenced to complain of right lumbar pain six weeks before, and that a peculiar hardness could be felt in the loin. No difficulty or pain in urination was observed, but the patient became pallid and lost flesh. On admission a large, smooth tumor could be felt occupying the right loin and hypochondrium, extending downward to the crest of the ilium, and projecting the width of four fingers beyond the median line. It was scarcely movable, and by inflation the colon was found to be displaced far downward and to the left side. The tumor could not be differentiated by percussion from the liver. The urine was absolutely normal, likewise all the other organs. June 19th the patient was chloroformed and the posterior aspect of the tumor was exposed by an incision beginning near the margin of the quadratus lumborum, and extending in an oblique direction downward and forward four inches beyond the median line of the abdomen. The peritoneal cavity was immediately opened and the collapsed intestines were packed away under hot towels. After this my first endeavor was to expose the renal vessels, as from their early occlusion I expected a considerable diminution of the otherwise dangerous and profuse hemorrhage. Accordingly, the peritoneum was stripped up from the kidney until the ureter and renal vessels were exposed. They were cut through between a double

ligature. A large portion of the peritoneum was so closely adherent to the mass that it had to be sacrificed. The most difficult part of the operation consisted in the separation of the upper portions of the mass from the under surface of the liver. A number of large veins communicating with the liver were torn through, and bled profusely. Artery-forceps being inapplicable, the bleeding surface was covered with an iodoform-gauze packing, by which the hemorrhage was perfectly controlled. After the kidney had been removed an appalling cavity lay exposed, in the bottom of which the vena cava could be seen bared to the length of six inches. An affluent vein of the size of a crow-quill had been torn out of the vena cava. The resultant defect was closed by a continuous lateral catgut suture of the vein-wall. While I was rapidly closing the peritoneal defect by a continuous catgut suture, and while the abdominal portion of the external wound was being closed by a number of button sutures, Dr. Lilienthal infused 1000 grammes of normal saline solution, this having become necessary by a threatening collapse. The wound was plugged with absorbent gauze brought out near the posterior angle, and was dressed. The patient was brought to bed with a thready pulse. Repeated attacks of collapse required constant vigilance and renewed energetic stimulation. During this period of depression, lasting until June 21st, the quantity of urine voided was decidedly below the normal, containing albumin, but no blood.

Stools passed involuntarily, and the child's condition remained critical until July 15th. The apathy and depression gradually disappeared. In spite of the extensive abdominal invasion the child took and retained considerable quantities of strongly stimulating liquid food, and to this circumstance is to be ascribed her recovery. The sutured parts healed by the first intention. The large cavity contracted rapidly, and the patient's general condition improved visibly, so that she could be discharged cured September 6th. Unfortunately, a relapse became manifest toward the end of November, when the patient was presented to me with a rapidly growing tumor, occupying the lower surface of the liver. It was inoperable. She died in December. The pathologist reported that the tumor was an alveolar sarcoma.

The removal of this very large and, in its upper circumference, closely adherent tumor became only possible through the adoption of the plan of exposing and securing the renal vessels at the beginning of the operation. The principle of first securing the important vessels holding close relations to a large tumor, before attempting its extirpation, was first promulgated by Langenbeck.

CASE II. *Chronic pyelitis; endothelioma of the right, pyelitic kidney; frequent hæmaturia; cystoscopy; extirpation; cure.*—I. D., peddler, aged forty-four years, had been suffering for eight months from frequent exhausting hæmaturia, which had not depended upon any form of traumatism. An operation was proposed to him in October by Dr. Flnhrer, but was declined. On readmission, January 19, 1897, I found in the right loin of the anæmic and somewhat emaciated man a movable nodular tumor, which was not painful to touch, and did not fluctuate. All other organs appeared normal. The urine, voided in sufficient quantity, was acid, had a specific gravity of 1021, and contained much pus, a few

blood-corpuscles, and much detritus imbedded in glairy mucus. The left kidney could not be felt. January 22d cystoscopy was done. The vesical mucous membrane appeared normal. On massage conducted along the course of the right ureter the exit of a cylindrical plug of consistent pus could be observed from the orifice of the right ureter. The left ureter appeared normal, and the escape from it of clear liquid was repeatedly seen. The vermicular material gained from the right ureter came away through a catheter passed after the cystoscopy, and consisted of pus, mucus, and blood. January 26th, the patient being anesthetized, the diseased kidney was easily removed through the usual oblique incision. The vessels of the pedicle and ureter were separately tied, and most of the wound was closed by suture. The day after the operation the urine showed no traces of pus, but contained a few blood-corpuscles, and was abundant. Healing was uneventful, and the patient was discharged cured, February 28th. The pathologist's report on this specimen was: pronounced alveolar arrangement of the sarcomatous elements, which clearly derived their origin from the endothelium of the smaller bloodvessels of the kidney.

**TECHNICAL REMARKS.** Uniform preference was given to an oblique incision beginning from the twelfth rib near the margin of the quadratus and extending downward and forward well into the abdominal wall, the length of the incision depending upon the size of the tumor to be dealt with. Simon's vertical incision yields much less space, and, in the case of large tumors, must be supplemented by one or more transversely placed incisions. Extending the oblique incision well forward has the advantage that the reflection of the peritoneum is readily found, and its accidental injury can be easily avoided. Furthermore, by following the guidance of the peritoneum the ureter is found without difficulty, and a kidney occupying a high position, and hidden by the lower ribs, can be exposed and made accessible without additional resection of the ribs. The renal vessels can also be readily secured, which step commends itself as the initiatory one in the extirpation of large renal tumors. The abdominal muscles should be always reunited in the anterior two-thirds of the wound by button sutures. Where contamination by the accidental escape of pus is not present, and the ureter and vessels were tied separately with catgut, the entire wound can be closed by sutures, with the exception of the posterior angle, which is to be left open for the admission of a large drainage-tube. Should the wound become contaminated by pus, it is safe to employ a thoroughgoing and careful packing of all recesses with absorbent gauze. This can be withdrawn on the fourth or fifth day. Should the wound then be found clean and sweet, the employment of a secondary suture will materially shorten the duration of the healing-process. Should it be necessary to apply a mass-ligature to the pedicle of the kidney, a solid, cylindrical band of rubber, about one-sixth of an inch in diameter, will be found very convenient and safe. It will never



slip, and will cut through much sooner than a silk ligature. Patients should be encouraged to leave the bed as soon as possible.

*Statistics.*

Plastic of the ureter . . . . .	1
Extirpation of the ureter . . . . .	1
Nephrotomy . . . . .	6
Nephrectomy . . . . .	7
Of these were cured . . . . .	10
Improved . . . . .	1
Died . . . . .	2

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## THE RELATIONSHIP OF OTOTOLOGY TO GENERAL MEDICINE.<sup>1</sup>

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SOMEWHAT more than twenty-five years ago one of the first distinctly special practitioners in this country made a statement in open meeting to the effect that general practitioners were to be considered as the rank and file, and specialists as the officers and staff of that army whose business it is to fight, to conquer, and to limit the ravages of disease. It is needless to say that this proposition met with but little favor from his hearers, and, notwithstanding the growth of specialism and the division of the work done by the medical profession into parts, having apparently often but very slight relationship to each other, it would meet with no more favor to-day. At the time when it was first made specialism in medicine was a new, to many a dreaded, and to some an abhorrent thing. The general practice of medicine left the more minute investigation of many organs and their diseases untouched; bacteriology was not, and aseptic surgery had not yet come to point the shorter path to many a long-sought goal and cut the knot of many a medical problem.

With the experience of a quarter of a century, the simile between the medical profession and an army can be only justly used by comparing that army to a brotherhood, the members of which have each and all equal, though different, functions, and if the general practitioner is to be classed with the rank and file, the specialist is to be regarded, not as in any way a superior officer, but as one of that rank and file sent out on special service; for, everywhere, the men who, with the foundation of the general study of medicine, and, still better, in addition, the practical study of general medicine as their base, go forward in any particular

<sup>1</sup> Read at the Congress of American Physicians and Surgeons, Washington, May, 1897.

line of investigation, may be regarded as skirmishers sent in advance, whose duty it is, first of all, to observe, and, secondly, to report back to the main body the result of their observations, and thus to indicate the lines on which the main body may advantageously proceed. It stands to reason, therefore, that the specialist, in whatever line his duty may take him, must be not only an observer, but in some way or other, and to a greater or less degree, a teacher; and the extent to which these functions have been fulfilled, and these relationships of the interdependent parts of the medical community have been developed in the last twenty-five years, it is interesting to observe.

The establishment of the nine special societies which, in addition to the five others of more general purpose, make this august Association, is a striking evidence of the fact that within the period mentioned the growth of scientific medicine and the enlargement of its field of observation have so increased as to make it impossible for any one student to cover completely and adequately the whole ground; and we realize that it is, as always, the study of the infinitely little which establishes the immeasurably great.

Thirty years ago, with few exceptions, there was not a sufficiently large number of medical men engaged in any special branch of research to form a society. The first of the several special societies forming the present Congress of American Physicians and Surgeons was founded in 1864, and the others followed in the order given in the circular of this Congress.

Buried deep beneath the surface, approachable only through a narrow and somewhat tortuous canal, containing within itself an example of almost every histological structure to be found within the human body, the human ear had long been a favorite study of those older anatomists whose minute and painstaking investigations and whose delicacy of research were in keeping with the work of their artist contemporaries. As always, the anatomist lays the foundation-stone; and to Meckel, Valsalva, Eustachius, and Corti we are indebted for that knowledge which has made the study of diseases of the ear, both in itself and in its relation to general medicine, one of the most fascinating of its kind. For not only does the inaccessibility of the organ require, on the one hand, trained manipulation in the surgical treatment of its diseases, but, on the other hand, the reflex relationship of the ear to other organs in the body, its visible and sometimes elucidative participation in other diseases, and its multiple office as an organ of hearing, as a peripheral organ of equilibration, and also as a supplemental organ of space-perception, afford wide opportunities for that theoretical conjecture which is the appetite of research and the stimulus to scientific nutrition.

The mental processes which lead to effective results are always slow and concentrative, and in the brotherhood of scientific research some

one mind advances a little beyond the others; some one thought reaching out seeks the support of facts, and makes suggestions which other minds may slowly follow, and precisely as the study of the structure of the body long preceded the knowledge of its functions, and still further antedated the conclusions drawn from physiological investigation which laid the foundation of the art remedial and curative, so the simple device of a centrally perforated concave mirror enabling the observer to stand behind his reflex light-source lay unnoticed and practically unapplied, until at the end of fifty years it came into use in the hands of the clinician, and revolutionized, or rather, one might properly say, made possible the study of the diseases of the ear in the living subject as they are studied and treated to-day, and the time has now passed when a celebrated aural surgeon saw patients only on bright days, and others used either a concentrating lens or limited their manipulations to parts appreciable by touch.

In 1864, when, in answer to a question from a visiting surgeon, "Why are you going abroad?" a young hospital house-officer replied, "To study diseases of the ear," he was met with this statement, "All that you can do for the ear you can do with a syringe." At that time there were in the United States but four medical men whose knowledge of diseases of the ear went much beyond that indicated by the preceding remark, and these gentlemen were regarded by many in their profession as absurd in their claims as to the possibility of doing anything for ear diseases beyond leaving them to the *vis medicatrix naturæ*, with hope for the best results.

The study of diseases of the eye had at that time taken a recognized place as a branch of surgery and medicine requiring special education and special manipulative skill on the part of its practitioners, and departments in general hospitals, or special hospitals themselves for the treatment of diseases of the eye had already been established in deference to the demands of public need, and were receiving the recognition necessary to their perpetuation in the form of public or private endowment. To these institutions there came, either as the result of a popular appreciation of the need of special treatment, or as the result of a popular association of ideas, patients suffering also from diseases of the ear; for such patients no provision was at first definitely made in the clinics of the general hospitals or the outpatient departments of eye-infirmaries, and they came under the care either of the general surgeon, or were, not uncommonly, transferred by him to the eye-department, as one dealing with a branch of minute if not minor surgery. The aural clinic, without special equipment of its own, came to be, therefore, in the beginning, by force of circumstances, and by lack of knowledge of its possibilities, an appendix to the department or hospital devoted to the treatment of diseases of the eye, and it was not, in this country, until

ophthalmic clinics had already been established, that a definite appointment as aural surgeon was made upon the staff of any of our hospitals, or that any instructor in this branch of medicine was appointed upon a faculty in a medical school. Even then the specialty was slow in making its way to professional and public recognition, and the earlier records of investigation, as shown in medical journals, and the transactions of societies were those rather of physiological investigation and clinical observation than of advance along the lines of surgical procedure in which this specialty has since taken its justly allotted place.

The foundation thus laid, however, was one which, once established, permitted the erection of a superstructure of minute definitions, and the history of the growth of otology as a department of both medicine and surgery may be taken to include the following stages: *First*, the substructure of anatomical investigation, the study of the component parts of the machine, and their assembled relationships to each other; *second*, physiological research, the study of the machine in action, of the purpose of its individual components, and of their effective working relationship; *third*, as an outgrowth of these, the investigations of the pathologist into changes effected by diseases; *fourth*, and based upon these, the work of the clinician with reference to preventable cause and possible repair.

The earlier anatomical works contained elaborate treatises and many accurate illustrations of the anatomy of the organ of hearing, and it is, perhaps, to its concealment within the body, as well as to the entrancing minuteness of its structure, that we owe the interest evoked by it in the earlier students of anatomy, and it is quite understandable that, with but little knowledge of acoustics, the study of an organ so complicated should have led to an intimate investigation of its parts, without the knowledge of their value, at a time when mysticism ruled and the study of the black art constituted it a profession. It is not until the fifteenth century that we find the record of any accurate investigation with regard to that structure, in which Empedocles (400 B. C.) had discovered a snail-shaped body, which he considered as the real organ of hearing. The sixteenth century was especially rich among the Italian anatomists in minute and accurate investigation of this subject. Vesalius described the long process of the malleus, the Eustachian tube, the vestibule, and the semicircular canals. Ingrassia is probably entitled to the honor of the discovery of the stapes. Fallopius described the tympanic cavity, the two fenestræ, and their communication with the vestibule and the cochlea, and the communication of the mastoid cells with the tympanum, and gave his name to the canal through which the facial nerve passes to its point of exit below the ear. Eustachius described the intrinsic muscles, the tensor tympani, and the stapedius, gave a more exact description of that passage leading from the middle

ear to the throat, discovered by Vesalius, but called the Eustachian tube; while Casserius, of Venice, in the closing years of the sixteenth century and the first of the seventeenth, gave a more complete description than had been elsewhere previously published of the sound-transmitting apparatus of the middle ear, and the sound-receiving portion of the labyrinth.

How recent is our more accurate information in regard to the structure of the ear is shown by the fact that in the middle of the eighteenth century the discoverer of the fluid of the labyrinth, Dominic Cotugno, won such a reputation by his work upon the internal ear that he was called to the anatomical chair at Naples; while it was not until a century later, and within the memory of those who hear these words, that the first accurate description of the terminal sound-transmitting apparatus of the human ear was given by the Marchese Corti.

While specialization in medicine is no more definitely marked anywhere than in otology, the investigation into the relation of diseases of the ear to the study of general medicine is one which relieves it from a narrowness of interpretation which would be inevitable were it confined merely to the exhibition of manual skill in the limited surgical field at its disposal. The long training which alone makes the evidence afforded by inspection of the ear valuable, and which, therefore, sets the otologist apart in his field as an observer, brings about the necessity of a relationship between the aurist and his brethren in general practice, and in other fields of special research, which would not pertain were the information which he can afford, as the result of his acquired skill as a diagnostician, more readily within the knowledge of the body of the medical profession as a whole—a relationship which it is needless to say, in addition to subserving a general, beneficent purpose, has its value in the encouragement of that interdependence which is one of the great sources of the strength, as well as of the activity, of the medical profession.

In this sense one of the gifts of otology to general medicine may be said to be the interpretation of hidden things, nowhere more clearly shown than in the diseases of the ear occurring coincidentally with the exanthemata of childhood, and in the review of the otological subjects of common interest, which makes the substance of this communication, it may very properly head the list.

That an acute congestion of the tympanic mucous membrane, resulting from closure of the Eustachian tube in the course of an acute coryza, may cause pain, general malaise, rise of temperature, and possibly nausea and vomiting in a young child, and that these symptoms may be relieved by the simple procedure of opening the Eustachian tube, are well known; but that these symptoms without pain, with excessive temperature, and evidences pointing to profound cerebral disturb-

ance, coma, and convulsions, may be due solely to the same cause, and entirely relieved by the same remedies, or by a simple puncture of the drumhead by means of a paracentesis-needle, is not as well known, and it is not until recently that we have come, in the profession as a whole, to realize the full importance of the stand taken by the late Dr. Edward H. Clarke, and quoted with approval by no less an authority than von Troeltsch in these words: "So necessary is a careful attention to the ear during the course of an acute exanthema that every physician who treats such a case without careful attention to the organ of hearing must be denominated an unscrupulous practitioner."<sup>1</sup>

The participation of the ear, also, in diseases of the pleural cavity in childhood, its implication during the process of dentition, and the serious general effect which the disturbance of so vascular and so sensitive a structure in intimate relationship with the brain may have as a complicating factor in some already serious general condition, make the investigation of the ear often a matter of grave importance; while, on the other hand, the demonstration of the fact that the ear is in no way concerned, and that its inspection gives the purely negative evidence of a healthy condition, may often help, by eliminating one possible factor of disorder, to the solution of a complicated problem in diagnosis, for it is especially in children, on account of the intimate reflex relationships of the ear, that that organ comes most frequently into question as a possibly causative or participative agent in other diseases.

"The great vascularity of the canal, the drumhead, and the middle ear in children favors the rapid course of an infective inflammatory process, and, in a child suffering from scarlet fever or measles, with other sufficient cause for rise of temperature and complaint of pain, a discharge from the ear is often, in default of the aural inspection which should be considered imperatively a part of the examination of all such cases, the first evidence of an implication of the ear."

The external auditory canal in the young child is principally cartilaginous, the bony canal, which in the adult forms the inner half, being formed partly by development of the osseous tympanic ring, and partly by the projection of the mastoid cells outward, forming the posterior wall. The facts that deficiency in bony development is not uncommon, and that the vascularity and delicacy of the soft tissues favor inflammatory invasion of the surrounding parts, emphasize the importance of keeping a strict watch upon all cases of diseases of the external and middle ear in children, a not uncommon complication to be borne in mind being the simple post-aural abscess, which, if not speedily treated surgically, results sometimes in extensive denudation of bone, superficial caries, and still more serious consequences.

<sup>1</sup> Perforation of the Membrana Tympani; its Causes and Treatment. AMERICAN JOURNAL OF THE MEDICAL SCIENCES, January, 1858.

The most frequent diseases of the ear in childhood are those occurring in the middle ear, either secondarily as the result of extension of inflammation from the external ear, or from the nasopharynx through the Eustachian tube, the latter by far the more common channel for the invasion of the middle ear, and the primary mechanical cause being usually either the simple congestion and swelling of the mucous membrane of the nose and nasopharynx, such as may occur in the course of an ordinary head-cold, the presence of the so-called adenoid growths in the nasopharynx, or the inflammation of the mucous membrane of this cavity, the Eustachian tube, and middle ear, incident to the course of the exanthemata.

In the first and second instances the middle ear is affected primarily as the result of the closure of the Eustachian tube, either by the swelling of its lining-membrane or by the pressure of the adenoid growth, the results being interference with the ventilation of the ear and with its blood-supply, and a congestion of the middle ear, which in coryza is usually more acute than in the cases where the pressure of the adenoid growth produces a static congestion. In the "earache of childhood," which is most commonly the result of a simple acute inflammation of the middle ear, attention must be directed not only to the organ specially affected, but to the nose and nasopharynx, and to the general condition of the child—a faulty diet, or faulty habits of life being often found to be the predisposing causes; while in the cases of adenoid growths early surgical treatment, thoroughly carried out, is the best remedial measure. One of several objections to the partial and frequently repeated operation without ether for the removal of adenoids is that, while the central growth may be thus disposed of, the region of the Eustachian tube, which needs especially careful manipulation, is left comparatively untouched, and while there may be satisfactory evidence of the establishment of nasal breathing, the passage of air through the Eustachian tubes to the middle ears is hindered by the presence of the remaining lateral portion of the adenoid growth; therefore, with reference to relief of the aural symptoms, the complete operation under anæsthesia, permitting thorough and careful manipulation of the tubal region, is preferable.

In the child the vascular anastomoses are large and numerous, and the divisions of the temporal bone do not assume their relationship of complete ossification until after puberty; the mastoid process, which subsequently forms the posterior wall of the osseous canal, and presents in its interior a mass of diploetic and pneumatic cells, the latter communicating with the middle-ear cavity, is represented in the young child by the mastoid antrum, in direct communication with the middle ear and immediately beneath the thin plate of bone, later known as the tegmen mastoideum, which forms the boundary between this and the cranial

cavity, while the sutura petroso-squamosa permits direct communication, through membranous connections, largely supplied with bloodvessels, between the lining-membrane of the tympanum and the meninges.

The importance of frequent objective examination of the ears during the course, especially in the acute stage, of scarlet fever and measles, is emphasized by the fact already stated, that the middle-ear disease, occurring as a complication of these affections, usually runs a rapidly destructive course, and by the further fact that aural symptoms, other than objective ones, unless unusually severe, are apt to be lost sight of in the consideration of the general condition of the child,<sup>1</sup> while the importance of bacteriological examination is nowhere better illustrated than in the fact that the Klebs-Loeffler bacillus has been found in a discharging ear long after it had ceased to be found in the throat.

Inasmuch as the ear is the channel through which a large part of the educational material is supplied to the brain during adolescence, the importance of testing the hearing and examining the ears of school-children is a subject which should command both the interest and the influence of the profession at large.

Everywhere the doctor, as is incumbent upon him from the high trust which he holds, and in the acknowledgment of the privilege which he has of being a doctor, is called upon more and more to exercise those duties of citizenship which have to deal with the questions of conservation to its greatest usefulness of the one piece of personal property with which each individual in the community is possessed from his birth, and the questions of public hygiene, of the perpetuation of health, and the prevention of disease, of the encouragement of healthy activity, and the utilization, as well as the protection, of the waste humanity which is a public charge, are making justifiably larger and more imperative demands upon the time and thought of the citizen-doctor.

The establishment of medical boards of supervision in public schools is one of the important opportunities afforded the medical specialist, for not only should the children be examined with reference to contagious diseases for the safety of those as yet uncontaminated, but they should be examined also with reference to their ability to avail themselves of the educational opportunities afforded. The truth of this proposition will be best appreciated by those whose study of school-children in respect to defects of sight and hearing will have shown them the unexpectedly large number of such children justly entitled to compensatory advantages.

"The generally received opinion that diminution of hearing in children in consequence of disease is rare, is a mistaken one; indeed, in some

<sup>1</sup> The Relation of an Aural Service to the Needs of a General Hospital for Children. Clarence J. Blake: Medical and Surgical Report of the Children's Hospital, Boston, 1895.



localities the cases of disease of the ear exceed in number the cases of disease of the eye, and, moreover, they are apparently on the increase; the steadily increasing demands upon the mental capacity accompanying the advances of the times bring the defects of hearing more prominently forward, because they show themselves to be a decided hindrance to the better education of the child. The results upon its later mental development of a marked diminution of hearing in a child are, unless compensated for by other instruction, decided and permanent, affecting the understanding, the character, the self-confidence, and, at a later period, the ability of self-support—mental tools, the possession of which is invaluable, and the want of which can never adequately be supplied.”<sup>1</sup> In this view it is certainly a matter of importance that more attention should be directed to the detection of partial deafness in school children, in order that proper remedial efforts may be made, or, in default thereof, proper compensatory advantages afforded.

Very nearly 25 per cent. of the patients attending our aural clinics are children under fourteen years of age; of this number 50 per cent. are the subjects of suppurative inflammation of the middle ear, and of this number 10 per cent. or more owe their origin to the exanthemata of childhood, while of the cases of deaf-mutism throughout the United States 27 per cent. have been the result of suppurative middle-ear disease in early childhood, and it is probable that the more thorough investigation, and the systematic examination of the ears of children in our deaf-mute schools, which it is to be hoped will some time be the rule, will show a still larger percentage of these cases.

Indeed, one of the duties of the American Otological Society, as representing to the profession at large its special line of work, is to urge that systematic examination of the ears of children in our deaf-mute institutions, which shall, in addition to throwing the needed light upon the etiology of this deficiency, give the individual opportunities for improvement not otherwise obtainable.

It is equally incumbent upon the members of the Society individually to give to such examinations their personal attention, and to this end the appointment of a competent aurist as a part of the staff of every considerable deaf-mute institution in this country would be an advantage; for, although the proportion of children in such institutions actually suffering from suppurative disease of the middle ear is probably not more than 5 per cent., the number of cases of partial hearing for some portion or other of the musical scale or of a vowel-tone perception is much larger than was formerly supposed, and in the schools in which the articulate method of instruction is pursued the utilization, and

<sup>1</sup> Franciska Schaeeling Thorn, 1872. Beiträge zu einer richtigen, leiblichen und geistl Erziehung gehörkranker kinder.

possibly the encouragement, of this tone-perception becomes an important factor not only in the patient's ability to interpret intellectually the substitute for sounds which is presented to him, but puts him on a better plane of communication with his fellowmen, by helping him to achieve a better articulation himself.

The surgery of the ear differs from special surgery of other portions of the body in the important respect of the wide range of manipulative skill required, from an exploratory tympanotomy done under reflected light, through a tube an inch long and less than half an inch in diameter, under the most exacting aseptic precautions, on the one hand, to an operation in a pus-cavity, including the thorough evacuation of the cellular structure of the mastoid process of the temporal bone, with the possible extension of the operative field to the cranial cavity, for the purpose of opening the lateral sinus, or evacuating a brain-abscess, on the other hand, and is certainly a field wide enough to awaken interest and fruitful enough to stimulate endeavor.

The progress which has been made in what may be called the minor operative procedures in ear diseases has come about as the result of a more intimate study of the structure of the ear on the part of the clinician, and a better adaptation of instruments to the end desired; and in this latter respect, as in many others, the aural specialist owes much to suggestions obtained from parallel lines of research, for the instruments necessary for the surgery of the middle ear are quite as delicate as those demanded for operations upon the eye, and the mechanical skill of the dentist has contributed much to the facility with which surgeons now treat diseases of bone.

The complicated construction of the temporal bone, and the number of important structures in contact with, or situated in very close relation to, the cavity of the middle ear, make the minute study of these relationships absolutely necessary as a preliminary to the adequate surgical treatment of its diseases, and what might well be made a text-book on the surgery and the surgical anatomy of the temporal bone yet remains to be written. Given in the adult a suppurative process in that bony cavity known as the tympanum, bounded by its outer wall of membrane which has been already punctured for the liberation of the contained and rapidly secreting pus, we have a possibility of the extension of the inflammatory process from the middle ear into the cavity of the mastoid bone, and thence of the passage of pus through some thin point in the wall of the mastoid cavity downward into the tissues of the neck, or inward into the cranial cavity, and there may be as the ultimate result of an inflammation starting in a cavity less than half an inch in its longest, and not more than a thirty-second of an inch in its shortest, diameter, a meningitis, a thrombosis of the lateral sinus, or an abscess of the brain. Professor Politzer, in one of his courses of lectures, was accustomed,

holding a temporal bone by its styloid process, and turning it slowly before the class, to say, "Gentlemen, the temporal bone has four sides, the outside is bounded by life, from which there comes through the opening of the external auditory canal one form of our appreciation of what life means; on the other three sides this bone is bounded by death." Dramatic as this statement was, it had the desired effect of a text in fixing the attention of the student, and it had, moreover, the merit of being, on further consideration and with a deeper knowledge of the subject, strictly true; for it is only necessary to place side by side the earlier records of autopsies which revealed an abscess of the brain, and the records of any considerable aural clinic to-day, with its list of successful operations upon the mastoid, the lateral sinus, and the brain, and to read the growing literature on the subject of otitic brain-abscess, to realize the gift in this respect of aural surgery to the profession, and the reason which the general surgeon has for respecting this special field, a gift which is, however, no more than an acknowledgment of favors received, for the whole success of the specialist in the surgery of the temporal bone is the fruit of the application of broad general surgical rules, together with special anatomical knowledge, to the solution of the critical problem; while the surgery of the middle ear in cases of suppurative disease is again that application of general surgical rules reduced to the dimensions of the cavity with which it has to deal.

The surgery of a suppurative process within the temporal bone which, beginning in the middle ear, has implicated the mastoid process and threatens contiguous structures, has to take into consideration, not merely the effort to save life, but also to conserve, so far as may be possible, the hearing-power, and to leave undisturbed the equilibrating function of the ear; but it has also to take into consideration the possibility of injury to important structures lying in minutely close relationship to the necessary operative field.

Under these circumstances it is a tenable proposition that no aural surgeon should undertake an operation upon the mastoid in a case of suppurative implication of that cavity without being prepared by his mental and material equipment to enlarge his operative field to any extent demanded, or without having, if he does not possess it himself, the necessary surgical assistance and counsel at hand.

The fact that it is easier for the aurist to learn to open the cranial cavity, and to operate upon the lateral sinns or the brain, than for the general surgeon to acquaint himself with the technical procedures of operation within the temporal bone and middle ear, is an argument in favor of leaving the subject of the intracranial complications of suppurative middle-ear disease where it now largely stands, in the hands of the special practitioner.

Of the diseases of the ear which come under the consideration of the

general practitioner, and which do not menace life, the first in the list is the so-called chronic catarrhal inflammation of the middle ear, which makes in the temperate zone about 30 per cent. of all the material ultimately referred to the aural specialist. Under the broad title of chronic non-suppurative diseases of the middle ear there lie hidden a series of changes in the soft tissues of the sound-transmitting apparatus which are still the subject of interested study and investigation; and one of the many fields of research open to the student of the future in otology is the further acquired differentiation of those alterations in structure, the result of disease, which interfere with the transmission of sound, and the etiology of which is often to be traced to a remote source. As an example of this may be taken the peculiar, and often puzzling, cases of variable hearing occurring in young women, who ultimately become very deaf to all sounds aërially conveyed. The great variations, occurring as they do, in girls soon after puberty, or in young women who were the subjects of considerable nervous and emotional strain, led, without other ascertainable cause, to the conclusion that these variations were purely of neural origin, and being merely symptomatic were to be disregarded or to be dealt with solely through attention to the general condition. A special study of these cases, however, through the aural speculum, showed, under conditions of the greatest hearing-impairment in many of them, a localized congestion of the tympanic mucous membrane, especially of the niche of the oval window around the stapes. This peculiar blush was found most commonly, periodically, in connection with the disturbance of the menstrual functions, or with other evidences of pelvic disorder, and, with the assistance of the gynecologist, it was found in the great majority of cases that there was either malposition of the uterus, erosion of its neck, or atresia of its cervical canal, and that the remedying of these defects had a very material and beneficial influence upon the localized circulatory disturbance and accompanying tissue-change in so important a portion of the middle ear as is the inner end of the sound-transmitting chain of bones.

Another example of the interdependence of the aurist and the general practitioner is shown in the cases of chronic non-suppurative middle-ear disease in which the deleterious changes in the lining-membrane of the tympanic cavity are furthered by general nervous overstrain, overtire, and the coincident train of disturbances of nutrition. In these cases the local treatment of the ear is futile, or of but little and temporary benefit without careful attention given to general hygiene and to a consideration of the condition of environment of the patient, climatic or otherwise. The dependence upon local treatment alone in such cases is sometimes mischievous in its results, and at least fails of the benefit which might accrue from a broader view of the situation, and

emphasizes the importance of a consultation between the aurist and physician, who, as the family adviser, has cognizance of conditions which may have an important bearing upon the etiology and progress of the case in question.

The first tendency in specialism is to lay stress upon the special character of the investigation to be followed, and to emphasize its individuality; but, with the broadening of the study, its relation to and dependence upon general scientific research become more and more evident. Specialized specialism ceases to exist in proportion as it separates itself, and grows and broadens only as it keeps up its relationship with the main body; and here again the military simile may be employed, for the specialist, who, as a skirmisher exploring an unknown country, cuts himself off from the main body which is his support and to which he owes his allegiance, and who seeks to exist to himself alone, fails of that usefulness in the line of duty which is the invariable price of any existence whatever.

One of the most striking examples of elucidative work in otology is that which has had to do with the definition and explanation of the curious complex of symptoms of which vertigo is the most marked and incapacitating manifestation.

With the recognition of the ear as a peripheral organ of equilibration, and with increased knowledge of its reflex relationship to the sympathetic nervous system, the better definition of its blood-supply, and the differentiation of its vasomotor tracts, came an explanation of much that had been vague and mystifying in those cases of vertigo of sudden onset which had formerly been referred either to abnormalities in the circulation of the brain, or to disturbances of the digestive apparatus, as their amenable cause; and the advances made in the study of the physiology of the sound-transmitting apparatus and in the application of surgical rules to the treatment of diseases of the middle ear have brought to our knowledge the positive advantage of establishing still another differentiation, that of *aural* as distinguished from *auditory* vertigo.

It is now a recognized fact that an effusion or hemorrhage occurring in the labyrinth may affect the hearing or the balancing power, or both, of the individual to a greater or less degree, according to its location and extent, and that the symptoms, so far as equilibration is concerned, may gradually disappear, to be reawakened at a later period by general conditions which induce a suspense of vasomotor inhibition, and thereby a secondary irritation of the terminal nerve-apparatus. It is further established that a fixation of the sound-transmitting apparatus of the middle ear, by doing away with or decreasing the function of one of the outlets from the labyrinth for pressure exerted by dilatation of the intralabyrinthine vessels, favors disturbance of the nervous end-appa-

ratus by a less degree of circulatory pressure than would be possible were the elasticity of the membranes of the round and oval windows and the mobility of the ossicular chain unimpaired.

The records of aural clinics show an increasing observation of cases of suppurative disease of the middle ear in which pressure upon the stapes as the result of a new growth or of epidermal exfoliation causes a series of symptoms very closely resembling those of the so-called Ménière's complex, and in which vertigo plays a prominent and disturbing part. These cases are almost invariably relieved by the removal of the morbid growths or accumulations, and the consequent release of the labyrinth from extrinsic mechanical pressure, and constitute the class of what may be called the mechanical or aural vertigoes. For purposes of distinction the first series of cases just cited may be termed auditory or labyrinthine vertigo, and the second class may be considered as lying between these two extremes. Beyond this grosser differentiation it is possible to go into minute definitions as to immediate or reflex cause and effect, and to follow the subject into the domain of the neurologist, before it shall in any degree have received the attention in investigation which its importance demands; while the question of intralabyrinthine lesions as an accompaniment of diseases of the kidneys, of the digestive apparatus, of the pelvic organs in women, and of the constitutional diseases of which syphilis stands at the head of the list in the number of cases of labyrinth-implication, and of diseases of the internal ear in children, present problems toward the solution of which the general practitioner and the otologist may well take counsel together.

There is one other subject which should command the attention both of the aurist and the general practitioner, and that is what may be called the "fatigue of deafness," a common and often unestimated factor in the causation and persistence of neurasthenia, and one imposing upon sometimes feeble shoulders a burden which it becomes us to lighten, if we cannot lift.

It may be taken as an accepted fact, among other evidences of the bounty of nature as set forth in the construction of this temple of the body, that those of us who have normal ears start in life with double the amount of hearing absolutely necessary for the ordinary purposes of social communion, and it is therefore possible to lose one-half of one's hearing-power before becoming conscious of the loss. Under these conditions, where the daily ordinary use of the hearing is regarded as the standard of perfection, it is easily understandable that a chronic progressive disease impairing the hearing may become fairly established before attention is turned to the necessity for interference, with a view to prevention and repair, and it is therefore not unusual to find in the majority of the chronic progressive diseases of which the slow impairment of hearing is the important symptom, that they have by the time they come into the

hands of the aurist long passed the possibility of prevention, and have established a condition which can be in only a moderate degree repaired. The apparent hopelessness of many of these cases, the impossibility of effecting by the treatment more than a slight improvement, should be no deterrent to the honest and strenuous effort to ameliorate the condition of cases of this class, and it is in many of them that the general practitioner, the family physician, and the specialist can best work hand-in-hand, for the deleteriously causative and influencing factors in the general condition in these cases are so many, and the progress toward improvement so slow, that the local treatment may often be advisedly limited to that which the patient can himself effect under the observation of his physician, with occasional examination and suggestion from the specialist; and there is probably no class of cases, although coming under the care of the aurist, which is so likely to become the subject of what may be termed over-treatment, either surgical or medical, as the chronic non suppurative diseases of the middle ear. It is especially in connection with these cases of slowly progressive impairment of hearing that the fatigue of deafness manifests itself. Few intelligent observers outside of the very deaf themselves, or of those who have to deal much with persons so afflicted, can appreciate the profound exhaustion resulting from the effort to compensate for a deficiency in this particular line of communication with the outer world in the person whose perception of that mode of motion to which we give the name of sound was once made without appreciable effort, and who has, under conditions of impaired hearing, first of all to make an effort to hear, and, in default of hearing, an effort to appreciate vocal utterance by watching the motion of the lips of the speaker; and finally, in default, either through lack of perceptive power or through ability only to catch consonant sounds which are formed in front of the mouth, to solve the puzzle of the spoken sentence by filling in the missing consonant sounds, those imperfectly heard or inadequately seen, from the appreciated context of the sentence; so that where once understanding came without effort, three distinct and appreciable brain-efforts are required: the first, to hear; the second, to see; and the third, to understand. In our estimate of the burdens of life, the consideration of which belongs especially to the ministry of the medical profession, we should, I think, all of us endeavor to estimate more justly as scientific observers, more kindly, perhaps, as fellow-creatures, the nervous strain, the restrictive limit to useful expenditure of energy, and the demand for compensatory consideration for the pitifully deaf.

It has been impossible within the compass of this address to do more than touch upon some of the points which make the relationship of otology to general medicine—a relationship which it becomes the practitioners of both to conserve and strengthen, with the purpose of keeping

the specialist from becoming narrow, and of giving the general practitioner opportunities for gaining something more than a superficial knowledge of this special line of work.

To this end the further establishment of obligatory courses in the medical schools, with clinical lectures and instruction in methods of diagnosis and treatment, with clinical conferences and a practical examination of the student at the close of the course, are among the suggestions to be made; while for the graduate student in this country, as is now the case abroad, systematic courses, including opportunities for the study of the structure and development of the ear, its anatomy, its bacteriology, and the pathology of its diseases, in addition to clinical instruction, should be afforded.

The experience of teachers in this department of medical instruction shows that more time is required to give a student the knowledge of diagnosis adequate to his future uses as a general practitioner than is required in almost any other branch of special medical study.

The inaccessibility of the deeper and more vulnerable parts of the ear, and the minuteness of the objective field, with the changes in the diagnostic picture presented during the ordinary course of any of the more important diseases, and the variations incident to complications which may occur, make accurate determination of the true condition, except to the trained observer, often a matter of great difficulty.

The inducement which led the medical student of thirty years ago to take up the study of diseases of the ear, because it presented a promising domain for original research, is as true to-day, with its widened horizon, as it was then, and grows with the growing appreciation on the part of the otologist that his study, in its demand for better preliminary education in acoustics, better knowledge of pathology, with its suggestions for future use, better knowledge of bacteriology in its relation to diseases of the ear, and better knowledge of the general diseases in which the ear may be implicated, is one which affords such great opportunities for scientific investigation and helpful usefulness as to make it worthy of the earnest and unwearying devotion of a lifetime.



## REVIEWS.

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A SYSTEM OF PRACTICAL MEDICINE BY AMERICAN AUTHORS. Edited by ALFRED LEE LOOMIS, M.D., LL.D., late Professor of Pathology and Practical Medicine in the New York University, and WILLIAM GILMAN THOMPSON, M.D., Professor of Materia Medica, Therapeutics, and Clinical Medicine in the New York University, Physician to the Presbyterian and Bellevue Hospitals, New York. Vol. I. Infectious Diseases. Philadelphia and New York: Lea Brothers & Co., 1897.

To attempt to estimate a work of serial issue by its first volume is to hazard the charge of hasty conclusion. In point of fact, one could not reasonably expect uniformity in such an undertaking. Nevertheless, the character of this work is undeniably stamped upon the section under review, and can be expressed by no other term than comprehensive. The barrier between exhaustiveness and prolixity has been observed, and, excepting more or less historical matter, there is no superfluous "padding" in these unusually elaborate treatises. Thus far we are presented with a group of quite independent monographs, of whose quality collectively too much cannot be said. The introduction to the work leads one to suppose that this rule will prevail, and that the work will be the complete presentation of subjects in their individual bearing, rather than an attempt to combine and correlate them. The growth of knowledge has already so determined the necessities of the case that it is no longer necessary to apologize for a work which deals only with practice and its foundations. Principles of medicine are so broadened and dignified in recent years as to deserve separate consideration, and a work is by no means incomplete which confines itself to either. Hence, in the volumes to come, if the same adherence to the practical and demonstrated is shown, it is but implied that the equally high consideration of speculative medicine belongs elsewhere.

Proceeding upon this line, it is quite fitting that the subject of infectious disease should be foremost. By far the most brilliant of the results of modern scientific investigation are to be found here, and it affords a striking introduction. No attempt is made to bring into this category any of the diseases whose infectiousness is under any considerable question, which seems wise and consistent. Other diseases of unquestioned infectiousness, as, for example, pneumonia, are not included, perhaps by reason of natural relations to other departments.

We confess to a fear that the discussion of pneumonia may be destined to be as to its topographic rather than its toxic relations, and hence would have welcomed it among the infections.

The opening chapters by Welch and Thayer are a full statement of the subject of Malaria at this writing. The entirely new aspect which this classical disease assumes in the light of modern research is intelli-

gibly described. It is gratifying to find that so eminent an observer as Welch favors the examination for malarial organisms without a stain in clinical work. This preference seems to be growing. The suggestion that temperature may be conservative is not new but pertinent, and serves to arouse the reflection that temperature *per se* has been altogether too much a *bête noir*.

It would be an occasion for gratitude if Thayer's crisp disposal of the subject of typho-malaria might end it for all time.

There is no excuse to enter into detailed criticism of these chapters. They are eminently satisfactory. Dr. Hamilton West discusses Dengue without a special feature, except that he modifies the statement that there are necessarily two paroxysms, and insists, of course, on the non-identity with yellow fever.

Typhoid fever, or, as he prefers, enteric fever, is given by Dr. J. C. Wilson about sixty-five pages of the closest clinical analysis. No discussion has come under our notice more painstaking. Our attention is here and there attracted by conclusions with which we are not in harmony. The relative prevalence of typhoid fever in wet or in dry weather is obviously determined by the factors in etiology in any particular locality, and is likely to be largely topographic. Communities whose infection occurs by reason of accidental flushing of sewage into the water-supply are notoriously more afflicted in seasons of flood. The possibility of infection without the typical intestinal lesion is admitted. The estimate of 30 to 50 per cent. fatality in hemorrhage seems much too high, unless the phrase "subsequent perforation and peritonitis" may be made to carry much of the odium. The loss of liver-dulness is not a safe clinical fact to tie to, in view of the various conditions in which it occurs. As usual, headache is set down as frontal, whereas the experiences of many agree that, while the frontal pain is usually present, the occipito-cervical pain is much more diagnostic. Proper emphasis is laid upon the atypical fever, concerning which most of the error in diagnosis arises, and consequent false conclusion as to therapeutics. Not enough stress is laid upon the fact that all the symptomatology becomes more or less atypical under the cold bath treatment, and that much of the literature descriptive of the "typhoid state" finds no illustration.

We second the emphasis laid upon disinfection of excreta, knowing well how inefficiently it is done.

A slip of the pen near the foot of page 210 makes poor water serve for good water.

The caution against fatiguing journeys after the onset of the malady is logical, but we think to be absolutely offset by manifest advantages in subsequent treatment if secured by the journey. The detail of treatment is admirably discussed, and invites no criticism except in respect to one question—alcohol. Possibly the text conveys an exaggerated impression of the reliance of the author upon alcohol as a routine. If it does not, we must seriously take issue upon this point. When one considers the element of toxæmia, the element of antitoxic effort, the element of elimination, and, further, the accumulating evidence that the relation of alcohol to these cardinal facts is either *nil* or unfavorable to the individual, we are driven from the time-honored position of reliance upon alcohol, and must relegate it to the class of emergency remedies, as to the merits of which much disagreement will be found.

Strychnine, to which many clinicians look with confidence, receives

but scant mention. The description of the bath-treatment is clear and calculated to encourage its use. One is inclined to differ from the view that the bath involves more labor. Nurses agree, so far as our inquiry has gone, that to accomplish the same results, even as to temperature, the bath is much less laborious than sponging.

A brief reference to the serumtherapy, properly non-committal, terminates the chapter. It is throughout a plain, full, instructive exposition of the subject.

Even this work, fresh from the pen of one thoroughly abreast of the time, is defective by the time it leaves the press. Since the edition, the Widal test for typhoid has arisen, been tried, and is rapidly taking its proper place as a diagnostic resource. Of course, of this there is no mention.

Considerable stress is laid upon hypodermoclysis and enteroclysis in the treatment of cholera. We welcome all practical suggestious looking to the utilization of this most rational procedure.

The chapter on Dyseutery is remarkably fine. Dr. West has dared to classify clinically and with a clearness and conviction that carry one with him. His picture of coexistent or successive phases; his refusal to narrow his definition by single symptoms; his defence of calomel as a rational remedy, all go to stamp his effort as in harmony with the spirit of the work.

The relation of ptomaines to abscess of the liver opens a broad field, and is very lightly touched upon. The plates in illustration are superior.

Professor Wilson again gives a close description of Influenza. His position that it is a disease of short duration, but with long-drawn-out sequelæ, is perhaps correct. However, the continuance of a specific toxic agency to which the many different phases and stages of this serious disease are referable is beyond dispute.

An exhaustive study by Latimer of Cerebro-spinal Meningitis is of great value. His pathologic and bacteriologic data are abundant, and fortunately he is very conservative as to conclusions. He suggests what will appeal to all clinicians—a clinical meningitis without typical morbid anatomy—a typical morbid anatomy without symptoms. The logical tendency is to disassociate morphology from symptomatology, referring both to toxic causes. Upon this line much is yet to be said.

Pyæmia and Septicæmia, by Atkinson, are well handled. His discussion of the nature and relations of thrombosis is very clear. It is noticeable that he makes no allusion to lymph-thrombosis, in spite of the prominence which that subject has assumed in septic dissemination. No allusion is made to streptococcus antitoxin, possibly because of the recentness of its production.

The eruptive diseases are, without exception, carefully treated, and except for full commendation need little comment.

If we could only believe with Welch in the efficacy of sulphur fumigation, disinfection would assume a much simpler aspect. We do not find quite fully stated the very close diagnosis that very exceptionally has to be made between smallpox and chickenpox. One such case will last one a lifetime.

Robinson, in discussing Scarlatina, does not offer any explanation of the marked mitigation in severity in recent years, but generally his discussion is most satisfactory. Twice he uses the expression "scarlatinal rheumatism," which seems to be a misconception of the pathology as

recently accepted. It is hard to believe that the boiling of carbolic solutions effects enough good to offset their obvious disadvantages, or that it is necessary to resort to greasing of the skin.

The author quotes Wilson, of Philadelphia, as favoring the administration of chloral throughout the disease in doses sufficient to produce sleepiness without narcotism. Assuming that he is correct in quotation, it seems to be a plan open to decided objection and to be, on the whole, meddlesome.

We regret to note that the author is inclined to make his recommendations as to hydrotherapy less imperative, because of the objections from the family or friends. Is it not time to stop compromising with the truth out of respect to prejudice?

Diphtheria is treated in the full light of modern knowledge; a careful defence of serumtherapy is justifiable, considering how much opposition exists. The duality of croup is admitted, and, as it seems to us, justly weighed.

The subject of Tuberculosis, by Osler, is thoroughly treated, and, as usual, is systematic, definite, and judicial. The noticeable feature of his chapter is that it is quite up to date, nothing of importance being omitted.

The chapter on Syphilis is excellent, though not marked by any radical views. The generally accepted doctrines are adhered to.

Tetanus is well discussed from the standpoint of infection, and the serumtherapy fairly considered. It is clearly premature to say much about this treatment.

The volume under review is really a great work. No one can go to it without profit. If the volumes to come maintain this standard, it will be a source of great gratification that, coupled with the rising reputation of the surviving editor, the enduring fame of the great clinician shall have a worthy monument.

H. B. F.

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A PRACTICAL TREATISE ON DISEASES OF THE SKIN, FOR THE USE OF STUDENTS AND PRACTITIONERS. Fourth and revised edition. By JAMES NEVINS HYDE, A.M., M.D., Professor of Skin and Venereal Diseases, Rush Medical College, Chicago; and FRANK H. MONTGOMERY, Lecturer on Dermatology and Genito-Urinary Diseases, Rush Medical College, Chicago. Illustrated with 110 engravings and 12 plates in colors and monochrome; pp. 808. Philadelphia and New York: Lea Brothers & Co., 1897.

THIS work is so well and favorably known to the profession that introductory remarks are unnecessary. The present edition has been altered in many places to meet the requirements especially of modern pathology and treatment, and much new matter has been added to the pages. Thus, we note changes in the articles on hydrocystoma, seborrhœa, erysipeloid, follicular eczema, seborrhœic dermatitis, and new matter or chapters on dermatitis repens, hydroa vaccini-forme, mycetoma, angiokeratoma, protozoan disease, and in many other instances. Much now antiquated matter has been eliminated from the former edition.

We are pleased to observe that the authors are especially conservative in the nomenclature and the classification employed, the latter being

mainly that of the American Dermatological Association. This fact renders the book of special value to students. The treatise may as a whole be regarded as a complete exposition of our knowledge of cutaneous medicine as it exists to-day. In addition it contains the views of the authors on all important questions relating to the subjects discussed, and we have no hesitation in stating that the teaching inculcated throughout is sound as well as practical. Everywhere we find evidences that the authors are cognizant of all that has been done in dermatological literature of late years, and they have been generous in the presentation of the material that is likely to prove permanent. The labors of American dermatologists in particular are fully recognized wherever valuable contributions have been made.

Much work has been done lately in the study of ringworm, especially by French and English investigators, with the result that a new field in mycology has been opened up, all of which is here duly considered and discussed. Drs. Hyde and Montgomery say that "it seems to be established that there are at least two distinct and unrelated forms (of fungus) capable of producing the appearance classed as ringworm: the *microsporon Audouini*, or small-spored fungus, and the *trichophyton*, a large-spored fungus. In London, Morris, Fox, Adamson, and others find the microsporon is responsible for more than 90 per cent. of all cases of ringworm of the scalp in children, and that it also occurs in some cases of ringworm of the body, and even in some of the suppurating forms of the disease (as kerion). The trichophyton is comparatively rare in London." This entire subject of ringworm, as developed by Sabouraud and others, is new and full of interest.

We recommend the book cordially, and desire to call attention to the fact that the subject is approached from a scientific standpoint, with full appreciation, however, of the practical therapeutical side of the matter. The diction and style are easy and agreeable. The reader, as page after page is turned over, involuntarily feels that no effort is required in following the authors.

L. A. D.

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THE YEAR-BOOK OF TREATMENT FOR 1897. A CRITICAL REVIEW FOR PRACTITIONERS OF MEDICINE AND SURGERY. By sixteen contributors. 8vo., pp. viii., 480. Philadelphia and New York: Lea Brothers & Co., 1897.

THIS is the thirteenth issue of this useful publication, and this fact may be accepted as evidence that it fulfills the objects that led to its inception and have justified its continuance. In a succession of twenty-five sections there have been incorporated at such length as seems consistent with the importance of each subject treated the best of the new things in medical art and science that have developed during the preceding year. Each section is, beside, prefaced by a brief summary analyzing the work of the year in the respective departments of medicine, and in many places editorial comments in brackets are incorporated in the body of the sections. That the selections have been judiciously made and the work well done is assured by the names of the several contributors, while the convenient form of the volume, the neat typography, and the fulness of the indices add materially to its usefulness.

A. A. E.

# PROGRESS OF MEDICAL SCIENCE.

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## THERAPEUTICS.

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UNDER THE CHARGE OF

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**Xeroform (Bismuth Tribromophenol).**—DR. JOSEF GRÜNFELD states that this drug (1) not only possesses a powerful antibacterial action, but by combining with toxins and ptomaines renders them harmless, setting free bismuth, which makes insoluble compounds with these poisons; (2) it has marked drying and astringent properties; (3) it is also a deodorant, and therefore particularly useful for wound-cavities about the digestive or urinary tract; (4) it is not irritant either to wounds or to surrounding soft parts; (5) it relieves pain partly through its contained bismuth and partly through the protective covering which it forms; (6) it is non-poisonous, from 75 to 90 grains having been taken internally without harm; (7) it stimulates granulation-tissue and skin-formation, therefore shortening the period of cure; (8) it is hæmostatic. As a result of absence of pain and irritation there is but little or no general reaction subsequent to local disease in the majority of instances, and even severe operations are not followed by fever. In eczema from iodoform the result—complete cure in twenty-four hours—exceeded all expectation. In eczema madidans of mycotic origin the healing was rapid and sure. Externally this drug is used as a powder, in 10, 20, and 30 per cent. gauze, in ointment, in pencils, and in suppositories. The manner of use is similar to that of iodoform. The gauze can be sterilized at 230° F. In many cases irrigation of the wound may be omitted, the field of operation being cleansed with sterilized pads. To insure contact, all scabs, crusts, scales, pus, detritus, necrosed tissue, and blood-clots must be carefully removed. In support of the above propositions the author cites twenty-three instances of the use of the drug.—*Wiener medicinische Blätter*, 1897, Nos. 1, S. 6; 2, S. 26; 3, S. 43.

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**The Treatment of Chilblains**—DR. F. W. FORBES ROSS applies the secondary current of the faradic battery from five to fifteen minutes, increasing the current gradually to high strength, the poles being in contact with the

affected area, having previously dipped the electrodes in a saturated solution of sodium chloride. The tissues are gradually blanched, commencing after about five minutes. The itching is completely and promptly stopped by the first application, and a second, one or two days afterward, usually suffices for a cure. Seldom, if ever, does a third or fourth application become necessary.—*The Lancet*, 1897, No. 3832, p. 425.

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**Antitoxin.**—DR. E. BEHRING states that diphtheria-antitoxin, as such, is absolutely harmless when administered to man or animals in health or disease. In support of this proposition may be cited: (1) that blood-serum containing antitoxin in whatever proportion acts within the organism precisely as does blood-serum without antitoxin; and (2) that, although the antitoxin-content of serum has steadily increased, the severity and frequency of untoward symptoms have not increased. The antitoxin of choice is that purified from albuminous substances, salts, and by-products, concentrated to such a degree that the small dose can be largely diluted with water and yet not exceed the size of an ordinary hypodermatic injection, and, in addition, that it shall be a permanent dry preparation and protected from contamination in closed containers. Of great importance is the use of this substance in prophylaxis, conferring an immunity which, although temporary, is reasonably certain.—*Fortschritte der Medicin*, 1897, No. 1, S. 1.

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**The Antitoxin-treatment of Diphtheria.**—DR. B. H. DETWILER believes that when this remedy is used within thirty-six hours of diphtheritic invasion there is a gradual fading away of the exudate, with immediate return of appetite and strength. In recent cases one thousand units are ample for the average case; some require a second injection, according to the elevation or depression of the temperature. While confident of the ability of antitoxin to destroy the bacilli in the circulation, he, however, prefers to use a 1 to 2000 solution of corrosive mercuric chloride locally or by spray, with calomel, until it acts freely on the secretions, in order to prevent reinfection. In case of failure it is believed that there is either an insufficient quantity injected or that the preparation is not reliable. Of his own cases, twenty-three in number, but one died, and that was a child of six months.—*Therapeutic Gazette*, 1897, No. 1, p. 1.

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**The Inhalation of Formalin.**—MR. J. LARDNER GREEN considers that the most rational treatment of catarrh and other diseases of the respiratory tract is by means of germicidal remedies, the most direct mode being by careful inhalation of a gas or vapor. The best results have been obtained from the vapor of formalin, one or two drops being placed inside of a respirator. If the disease be in the acute stage, one drop diluted with water will suffice. If the vapor be too stimulating, the respirator should be temporarily removed from the face to dilute the vapor with air; a feeling of warmth and comfort will follow. The use of this method is strongly advised in the early stages of tuberculous consumption, when usually it will be found, on microscopical examination of the sputum, that the number of both the micrococcus pneumoniae and also of the bacillus tuberculosis will be rapidly lessened.—*British Medical Journal*, 1897, No. 1822, p. 202.

**Treatment of Pulmonary Tuberculosis.**—DR. BERTOLA has treated nineteen patients with the serum of Maragliano. From his observations he concludes that (1) it gives rise to no general or local reaction; (2) it is well borne and without ill effects upon heart or bloodvessels; (3) it lessens and subdues fever; (4) it improves the general condition and increases, in nearly all cases, the body-weight; (5) it possesses a specific action upon the tuberculosis, but should be administered for a long time.—*Therapeutische Monatshefte*, 1897, Heft 1, S. 37.

**The Treatment of Intestinal Toxæmia.**—DR. MATTHEW D. MANN, in searching for an intestinal antiseptic, believes that naphthalin has met with the most favor. Bismuth subgallate, as well as nearly all of the agents which have been tried, has disappointed. Benzosol is worthy of a more extended trial. Practically, hydrochloric acid seems to give satisfaction, and in support of its use is the theory of Simon that the free hydrochloric acid of the gastric juice keeps intestinal putrefaction within limits. Very careful regulation of diet and attention to the general surroundings, environment, and hygiene of the individual are the best agents; these include the proper ingestion of water, the use of massage, exercise, fresh air, and sunshine.—*Yale Medical Journal*, 1897, No. 4, p. 149.

**The Treatment of Infectious Pyelonephritis.**—MESSRS. BOVET and HUCHARD give an instance of the successful use of subcutaneous injections of a saline solution of sodium chloride. They were dealing with pyelitis from repetition, which, after a chilling, passed rapidly into an infectious pyelonephritis with phenomena of general intoxication. These cases are by no means rare among the richer patients, whose occupation does not permit them to satisfy, at the desired time, the excretory functions of the intestine and bladder. If careful inquiry is made, it will be learned that their urine is almost always turbid, of a strong odor, and deposits mucus, often pus, and perhaps with a trace of albumin. With these patients, after a too copious dinner or a fatiguing ball they may be taken with a chill, which is followed by a fever, bilious attack, and pains in the lower limbs, which may suggest the onset of influenza or typhoid fever. The urine, upon examination, will be found to be diminished in quantity, dark in color, depositing mucus or pus containing a third, or less, of 1 per cent. of albumin and a notable proportion of urobilin. This deposit may already contain the germs of a latent infection, and needs only an opportunity to awaken a condition which leads to uræmia or other form of poisoning. Such an instance is reported in detail in which success followed the use of a seven *per mille* serum, both hypodermatically and by the rectum. The urine showed the following changes: (1) Increase from twenty to fifty and even sixty-five ounces. (2) The chlorides increased more than fivefold. (3) The albumin diminished to one-thirtieth of its original amount. The largest daily amount used hypodermatically was twenty-six ounces; by the rectum it was sixty-six ounces.—*Bulletin Général de Thérapeutique*, 1897, 2 liv. p. 75.

**Treatment of Gonorrhœal Cystitis.**—DR. M. HAROVITZ counsels rest in bed, avoidance of all local irritations, administration of morphine, codeine



rectal suppositories or of extract of hyoscyamus, use of local warm baths, forbidding of spices, alcohol, and carbonated waters, and the giving of laxatives. Priapism can be avoided by the bromides, with camphor or cannabis indica. For the cystitis itself, salol, in three doses of fifteen grains each, sodium salicylate or sodium benzoate is useful. Naturally the balsams, oil of santal, cubeb, and kava-kava are to be considered. If the digestion is excellent, balsam of copaiva, balsam of Peru, and oil of turpentine may be employed. Of importance is the use of infusions, as of uva ursi, quite likely on account of their diluting the urine. If there is delay in the disappearance of the symptoms, then, after emptying the bladder of residual urine, an injection of three ounces of a one *per mille* lukewarm silver solution will be necessary.—*Centralblatt für die Gesamte Therapie*, 1897, Heft 2, S. 65.

**Treatment of Puerperal Fever.**—DR. A. J. IWANOFF presents an argument for the use of inunctions of gray mercurial ointment. Eight instances of its employment are cited, all of recovery. In general two inunctions only were necessary, each of a little less than an ounce of the ointment, the first into the skin of the abdomen, the second, an hour later, into that of the lower extremities. The inunction lasts an hour, and the residue of the ointment is removed with warm olive oil, the skin washed and dried with cotton and protected by waterproof dressings and flannel. Frequent washings of the mouth with a 4 per cent. solution of potassium chlorate should be made during the treatment and in some instances six-grain doses thrice daily given internally.—*Therapeutische Wochenschrift*, 1897, No. 4, S. 73.

**The Treatment of Syphilis.**—MM. H. HALLOPEAU and G. BUREAU present the following formula for hypodermatic injection: mercury salicylate, 4; oil of vaseline, 30. The mercurial salt is fused, washed with boiling alcohol, dried in an oven, triturated in a sterilized mortar with the oil of vaseline, and then placed in a sterilized flask. The material should be freshly prepared and thoroughly fused, otherwise it will obstruct the needle during injection. They conclude that: (1) Intramuscular injection of this preparation is one of the best methods of administering mercury. (2) The pain to which it gives rise is bearable by the great majority of patients. (3) It never produces salivation. (4) Only with great rarity does it produce local suppuration (twelve times in 176,000 injections, Tarnowsky). (5) If, by fault of administration, the injection enters the veins, the symptoms of pulmonary embolism rapidly disappear, without serious consequences. (6) The treatment is remarkably active. (7) It is not contraindicated in case of albuminuria of syphilitic origin. The dose of the salt is one grain twice each week.—*Bulletin Général de Thérapeutique*, 1897, 1 liv., p. 15.

**Concerning Suppositories.**—DRS. L. LEWIN and F. ESCHBAUM place as essential requirements of a suppository that (1) the drug shall be evenly disseminated through it; (2) rapidly and easily separated from it; (3) be as sterile as is possible; (4) be easily introduced; and (5) be capable of exact dosage. The cocoa-butter suppository fails in the first requirement because the drug is incorporated while the vehicle is liquid from the application, and during the cooling settles in the apex, so that this contains more of the drug than the base.

The glycerin-gelatin suppository presents the disadvantages of (1) being generally not sterile; (2) the source of the gelatin is unknown and may contain improper substances; and (3) the quantity of glycerin may produce local irritation. The agar suppositories are made as follows: the commercial agar is powdered and heated with twenty-nine parts of water in a bath until it becomes a gelatinous mass. The acidity is now neutralized by the addition of 1 per cent. of sodium bicarbonate, and the mass is ready for use. In practice, however, the powder is neutralized, the drug added to it, and both with the above amount of water transferred to a flask, which is tightly corked, heated over a water-bath, and the contents poured into the moulds. This method results in an even distribution of the drug through the suppository.—*Deutsche medicinische Wochenschrift*, 1897, No. 2, S. 20.

**The Use of Iron in Chlorosis.**—DR. ISRAEL concerns himself with the choice of this preparation. His preference is for the liquor ferri sesquichloridi, which, in the German Pharmacopœia, contains 10 per cent. of iron. This is administered as one drop in a wineglass of water thrice daily after meals, increasing by drops until the patient receives twelve drops daily. Thus given it is a refreshing drink, improves the appetite, and, if a glass tube is used, will not blacken the teeth.—*Therapeutische Monatshefte*, 1897, Heft 1, S. 21.

**Bismuth Tribromophenol.**—DR. CHARLES GREENE CUMSTON states that this compound is recognized as most active of all the groups of antiseptics: first, because it contains, besides 49 per cent. of bismuth oxide, 50 per cent. of tribromophenol; and, secondly, because the latter is more antiseptic than phenol. The substance may be heated to 230° F., and therefore sterilized without decomposition. It possesses a large field of usefulness in surgery. In open wounds, these in which no infection has taken place, it will secure union by first intention. It appears to exercise a calming influence upon burns, like iodoform. In some cases of *pruritus localis sine materia* the itching was stopped by its application. When used after the curettment of tuberculous abscess or glands cicatrization was rapid. On account of the continual development of tribromophenol and bismuth oxide a wound will be kept in a perfectly aseptic condition, while the slightly irritating action of the former gives a fresh and healthy aspect to the wound. Since iodoform produces granulation-tissue it may be first applied, and later cicatrization can be accomplished with the bismuth product. In gynecological cases it appears to have a marked influence upon the regeneration of the epithelium. In no case did any toxic symptoms appear, although the drug has been freely used. It is strongly recommended as a safe and sure antiseptic, and in many respects superior to iodoform or other powders of this class.—*Boston Medical and Surgical Journal*, 1897, No. 2, p. 37.

**The Serum-treatment of Malignant Growths.**—DR. W. H. HAPPEL reports three instances, in the last of which there was central sloughing with peripheral increase, which shows rather conclusively that the action of the serum is local and due in great part to a limiting peripheral inflammation set up by its use. It does not, therefore, correct any dyscrasia. For this reason

large tumors will never give very good results, as it will be impossible to place enough injections about the periphery of the growth, in most cases, at intervals of time sufficiently short to destroy the growth before the latter destroys the patient. In fact, the practical disappearance of the growth and the simultaneous death of the patient have been observed sufficiently often to teach us that the cancerous dyscrasia may kill a patient under serum-treatment even while the tumor is palpably diminishing, and that, consequently, the serum-treatment should be strictly confined to absolutely inoperable cases and should not be employed while the knife can still be used.—*Albany Medical Annual*, 1897, No. 1, p. 21.

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**Picric-acid Stains.**—M. CRÉQUY, having made use of the picric-acid treatment for burns, has found that there remained an indelible yellow stain upon the skin. It has been suggested by Brun that for these stains upon linen a prolonged immersion in borie-acid solution suffices for their removal, but this is much less effectual for cutaneous stains.—*Revue de Thérapeutique*, 1897, No. 3, p. 85.

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**The Treatment of Recurrent Mammary Sarcoma.**—MR. A. MARMADUKE SHIELD reports a single fatal instance of the use of the mixture of the toxins of the streptococcus of erysipelas and the bacillus prodigiosus. There was evidently no reason for the result either in the fluid or the method. A smart reaction followed the first two injections. After that these injections made in increasing quantities failed to have effect. After a week's interval severe reaction was again established. The injection caused undoubted shrinkage and apparent disappearance of the growth, but this seemed due purely to inflammatory action in a soft neoplasm rather than to any purely specific action of the fluid. At the necropsy signs of general pyæmia were present; secondary abscesses and infarcts were found in the liver, myocardium, kidneys, and right knee-joint. The growth beneath the clavicle was necrotic, and it was particularly important to note that beneath the site of the nodules which had disappeared there was some purulent infiltration of the thoracic muscles. In the secondary abscesses the staphylococcus aureus was found. This is noteworthy, as the original fluid was prepared from streptococci. In this instance the serious nature of the disease justified the employment of a perilous mode of treatment, which undoubtedly shortened life. Slater sums up this method in stating that the treatment with toxins is occasionally successful, but gives rise to severe symptoms.—*British Medical Journal*, 1897, No. 1822, p. 193.

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**Poisoning by Antipyrin.**—M. DALCHÉ reports an instance of an ulceromembranous stomatitis following the ingestion of fifteen grains of this drug. A month later, after the same dose, there were noted swelling of the mouth, bleeding from the gums, numerous ulcerations of the mucous membrane of the tongue, lips, and cheeks. Four weeks later, after a single dose of one-half this amount, there rapidly supervened an intense, acute coryza, swelling of the mouth, and an insupportable itching of the thorax, abdomen, and serotum. Four days later ulcerations the size of a pea, covered with false membrane, were found upon the lips; the gums were bleeding and presented a

red border, but the tongue was free. The abdomen exhibited a purpuric eruption, which had commenced to fade, and upon the scrotum were three small but markedly painful ulcerations. The patient had been in good health until a few months before this observation, although for four years he had complained of hepatic colic, for which he had visited Vichy each summer. At his last visit sugar had been found in the urine, but no albumin. During the second attack, above noted, neither sugar nor albumin was found, but an excess of urates and phosphates. During the last attack there was no albumin, but over 3 per cent. of sugar, an excess of sodium urate, with normal amounts of urica and phosphoric acid. There were no disturbing symptoms of diabetes, as polydipsia or polyphagia, and his reflexes were normal.—*Bulletin Général de Thérapeutique*, 1897, 1 liv. p. 29.

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## MEDICINE.

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**Recovery from Addison's Disease after Removal of a Tuberculous Adrenal.**—OESTREICH (*Zeitschrift für klin. Med.*, Bd. 31, p. 123) reports the following: a woman, aged fifty-five years, complained for three or four years of gradually increasing, finally extreme muscular weakness, malaise, palpitation of the heart, shortness of breath, and œdema of the feet. For six months there were night-sweats, pain in the epigastrium, and vomiting. Blood was never vomited. There was decrease in weight from ninety-eight to seventy pounds. Physical examination showed slight dulness and harsh respiration over the left apex. The sputum was free from tubercle-bacilli. In the stomach-region, lying directly on the spinal column, was a small, movable, firm, nodular tumor. Pressure over it brought on a characteristic attack of pain. There was slight dilatation of the stomach. On distending the latter the tumor could not be felt. There was free hydrochloric, but no lactic acid. The skin and mucous membranes were not bronzed. The diagnosis was retroperitoneal glandular tumor, and, being considered the cause of the symptoms, an operation was performed.

The tumor was readily found, in close relation to the aorta, so that at first it seemed possibly aneurismal. It was finally removed, leaving the aorta exposed for a distance of 8 cm. The other relations of the tumor were not accurately made out. The patient recovered in two weeks. All the symptoms disappeared after the operation. Eight months later she was well, weighed eighty-seven pounds, and was stronger than she had been for years.

The tumor proved to be a tuberculous adrenal, partly caseous, partly calcified, containing bacilli. The medullary part was almost entirely destroyed by the growth, but portions of the pigment-layer were present. The mass had a thick fibrous capsule, which, however, had not limited the spread of the growth, as there were fresh tubercles in the surrounding fat. After some general remarks, and a discussion of the diagnosis made, the author makes a plea for similar operations. The diseased adrenal can be more readily removed than a healthy one, being larger and more consistent, having a thick capsule, and the retroperitoneal fat being diminished. In such operations both adrenals should be exposed, their condition determined, and one or both removed, according to the indications.

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**Surgical Scarlatina.**—INGERSLEV (*Zeitschrift für klin. Med.*, Bd. 31, p. 171) reports three cases in which scarlet fever began in solutions of continuity of the skin, the patients having been exposed to other cases of scarlatina. In one case the virus was probably introduced through a paronychia and corresponding lymphangitis. In the other two, wounds from burns furnished the points of entrance. The symptoms in all the cases were characteristic, except as regards the throat-symptoms. In the first case the pharyngitis developed late and was mild; in the others there was only a mild efflorescence in the throat. The author suggests that if a careful examination of the skin were more frequently made in scarlatina with mild throat-lesions, cases similar to those now reported would be more frequent, a wound in the skin being easily overlooked.

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**Alterations in the Kidneys in Atrophic Infants.**—SIMMONDS has endeavored to throw more light on the cause of the renal alterations which various observers have found in infants with acute and chronic gastro-intestinal disease. He examined the bodies of sixty atrophic infants without intestinal catarrh, excluding also cases of lues, acute infections, severe supuration, tuberculosis, and catarrhal pneumonia. In all cases the kidneys showed lesions in the parenchyma of various degrees of severity. These changes bore no relation to the severity of the atrophy, nor could they be explained by the medicinal treatment or by complications such as rickets or catarrhal pneumonia. The only constant change in all the cases was an exudative inflammation in the tympanic cavity. The author looks on this as the source of the renal degeneration, holding that large numbers of pathogenic microbes develop in the tympanum; that they or their toxins enter the circulation and so produce the degeneration in the kidneys. In many cases the same kinds of bacteria were found in the ear and the kidney. From these investigations the author concludes that the renal changes following gastro-intestinal disease may also be due to inflammation in the ear. —*Deutsches Archiv f. klin. Med.*, Bd. 56, p. 385.

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**Gastric Mycoses.**—SCHMILINSKY (*Jahrb. der Hamburg. Staatskrankenhäuser*, 1893-'94, iv. p. 388) reports some rare cases of gastric disease. One was a case of primary anthrax of the stomach. The patient died after four days' illness, without a diagnosis being made. Autopsy showed swelling and hemorrhagic infiltration of the bronchial and mesenteric glands. There was

swelling of all the mucous membranes of the stomach, with a number of blackish-red elevations, and a number of erosions in the pylorus. The cæcum contained small blackish-red elevations. Microscopic and bacteriological examinations of the glands and the foci in the stomach gave a pure culture of anthrax bacilli. These were especially in the lymph-vessels around the glands in the mucosa. The superficial lesions showed streptococcus only.

In a case of streptococcus infection after scarlet fever and diphtheria the stomach was found affected much as in the preceding case, but here the cocci were found in the submucosa especially. The cocci were partly in the lymph-spaces, partly in the tissues.

In a third case, an atrophic infant a month old, a whitish elevation the size of a pin-head was found in the pylorus. The umbilical artery contained pus. The necrotic papule in the stomach contained a bacillus like the colon bacillus, partly in the tissues, partly in the arterioles. It is possible the umbilical stump was infected with fecal matter.

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**The Diaphragm-phenomenon of Litten in Pulmonary Tuberculosis.**—DR. E. RUMPF (*Berliner klin. Wochenschrift*, 1897, No. 6) publishes an interesting analysis of the study of the diaphragm-phenomenon in seventy cases of pulmonary tuberculosis. He points out, in the first place, the possible causes of error, such as imperfect breathing on one or both sides, sometimes found in healthy subjects, and emphasizes the importance of deep abdominal breathing in testing the mobility of the diaphragm. His results in tuberculosis include many interesting details too lengthy to quote, but the most important feature may be summarized as follows: Litten's statements were confirmed, viz, that the motion of the diaphragm is normally visible between the seventh and ninth ribs, and has an extent of 6 to 7 cm. In tuberculosis, at least when it produces symptoms, variations from the normal are very frequent, but the existence of a normal Litten's phenomenon does not exclude tuberculosis. Out of the seventy cases the symptom was absent five times, in mild cases with the disease limited to the apices. In a sixth case it was absent, although there were remains of old pleurisy over both bases. On the whole, Litten's sign has only relative importance in the diagnosis of tuberculosis. Normal extent does not exclude the possibility of disease, and an abnormal diaphragmatic motion can occur in health or in various diseases. At most we can say that a normal movement excludes disease involving the greater part of the lungs. The phenomenon is useful in determining improvement in the breathing. The author found that the motion in some cases was doubled in extent during treatment. It may also be useful sometimes in detecting simulation. But the facts that the phenomenon does not correspond to the severity of the disease, that various diseases, and even such things as sex, obesity, habit, intelligence, and the inclinations of the patient affect its development will prevent Litten's phenomenon from being widely used in practice.

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**Idiopathic Dilatation of the Œsophagus.**—RUMPEL (*Berliner klin. Wochenschrift*, 1897, No. 6) presented an interesting case of this kind before the *Aerztlicher Verein* in Hamburg. The patient was a man of twenty-five

years, who began to have vomiting after a severe attack of pneumonia. There was pain on swallowing. The conditions resembled nervous vomiting. On passing a tube 28 cm. into the œsophagus, 250–300 c.cm. of slightly alkaline fluid were obtained. After pouring in weak blue litmus solution it was withdrawn unaltered and in the same quantity as before. After manipulating the tube for some time the patient was able to pass it into the stomach. It was then possible to pass a thin tube into the œsophagus beside the tube in the stomach, and wash out the two organs separately. Further experiments showed that the dilatation of the œsophagus was diffuse and not lateral. The reporter considered the condition due to a spasmodic stricture of the lowest part of the œsophagus.

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**Degeneration of the Liver in Gastroenteritis.**—DR. MARTIN THIEMICH calls attention to a subject that has not been as carefully studied as its importance seems to warrant. In fact, not only have some authors asserted that the degenerative changes in the liver here referred to are of no importance, but a few have even denied their occurrence, or have mistaken the drops of fat for “vacuoles.” The author examined the livers in thirty-two cases of gastroenteritis, with one exception from infants in the first year. None of the subjects had symptoms of acute yellow atrophy. In nine cases there was no fatty degeneration, or at most a few droplets in the periphery of the acini, with well-staining liver-cells. In twenty cases the liver was slightly enlarged or of normal size. There was fatty degeneration of moderate degree, varying widely in distribution in different cases. In some the periphery was fatty degenerated, in others there was an area of degeneration around the central vein, in others the distribution was very irregular. The fat varied in size from the finest grains to large drops, distending the liver-cells and pressing the nuclei to the sides. The nuclei were often degenerated. In three cases the fatty degeneration was far advanced. The livers were large, pale-gray, and of low specific gravity. Sections showed total degeneration of liver-cells; in fact, so extensive was the accumulation of fat that it was often impossible to say whether it was in the cell or not. There were in such cases collections of small cells along the vessels. The question whether the fat in these cases came from food could easily be answered in the negative, as most of the patients took none in the last days of life. Alcohol had not been used. The author shows the futility of trying to determine in such cases whether the condition is one of degeneration in the strict sense, or infiltration. The fact remains that the presence of the fat in such cases is pathological, and the author inclines to the opinion that the fat is deposited because the cells are diseased and their metabolic function impaired. The cause of this he finds in an intoxication, either by bacterial poisons, by products of intermediate tissue-change, or poisons from the food. The importance of such processes in the symptomatology and prognosis of intestinal disease is evident, but requires much further investigation.—*Beiträge zur path. Anat.*, Bd. xx. p. 179.

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**Presystolic Apex-murmurs.**—KASAN-BECK (*Centralblatt für inn. Med.*, 1897, No. 6) has examined this subject in the literature and clinically. In sixteen out of nineteen cases in which a presystolic murmur was audible in

the apex-region, there were symptoms of aortic insufficiency and mitral stenosis; but post-mortem examination showed no narrowing of the mitral orifice. In other cases with similar murmurs adhesive pericarditis was disclosed. Phœar reported a similar case where only enlargement of the left ventricle was present. The author refers to the cases reported by Flint, Guitéras and Fischer, and also to a case of Picot, in which a presystolic murmur was ascribed to hysterical contraction of the papillary muscles. The author's own case, a man aged sixty-three years, complained of pain in the thorax spreading down the arms, and marked dyspnoea. There was venous pulse in both sides of the neck and in the thyroid and mammary veins. The apex-beat was in the sixth interspace outside the nipple-line, and very strong. The arteries were sclerotic, the radial easily compressible. The heart-dulness was enlarged in all directions. At the apex was a loud presystolic murmur with a dull first and a loud second sound. Over the tricuspid the first sound was dull, the second loud and pure. The second pulmonary sound was accentuated. The diagnosis was stenosis and insufficiency of the mitral valve, relative insufficiency of the tricuspid, dilatation and hypertrophy of both ventricles, arteriosclerosis.

Autopsy showed no stenosis of the mitral orifice, but relative insufficiency of both venous orifices. In the apex was an aneurismal dilatation the size of an apple. There was marked arteriosclerosis, affecting especially the vertical branch of the left coronary artery. The author explains the presystolic murmur by the change in the blood-currents caused by the aneurism. The absence of systolic murmurs is interesting.

**Tabes Dorsalis and Movable Kidney.**—DR. A. HABEL (*Centralblatt für inn. Med.*, 1897, No. 7) calls attention to the coincidence of these two conditions in Eichhorst's clinic. Aside from reports by Eichhorst and Brieger the matter does not seem to have been mentioned before. Since 1885, in the clinic named, sixty-eight cases of tabes were treated. Twenty-four of these were in women. In six cases, all women, there was movable kidney, in one case movable liver also. This proportion of cases with movable kidney is, of course, not remarkable in itself; but Habel rightly says it is remarkable in that the total number of cases of movable kidney among the women patients of the clinic was only 1 per cent. The author thinks it possible that tabes may favor the occurrence of movable kidney, and fortifies himself with the analogy of neurasthenia. He suggests that the condition may be due to emaciation or to a relaxation of the abdominal ligaments. The fact that movable kidney was found only in the women tabetics is not overlooked by Habel, but any possible objection to his argument is met with the true but remarkable answer that movable kidney is rare in men. The article is of value in calling attention to a matter not generally considered, but the author should tell us when he writes again on the subject how he explains the very large proportion of women tabetics in his series. His method of arguing might lead to the conclusion that floating kidneys cause tabes in women.

**Paroxysmal Tachycardia.**—BUNZEL (*Prager med. Wochenschrift*, 1896, Nos. 28 and 29) reports the case of a woman, aged fifty years, who had rheu-



matism sixteen years ago, and who for two years has had attacks which begin with a feeling of heat along the back and a diminution of the size of the pulse. Then rapid pulsations begin in the jugular veins, and the head nods synchronously. The lung-boundaries and respiration are normal. The heart-dulness during the intervals reaches the middle of the sternum. There are loud diastolic murmurs in the apex and mitral areas. In the attacks the cardiac dulness becomes enlarged to the right and above; the pulserises from 72 to 164; epigastric and hepatic pulsations appear, and a tone can be heard in the crural arteries. There is never œdema or alteration of the quantity of urine. In the attacks the urine shows cloudiness with acetic acid and potassium ferrocyanide, and numbers of oxalate crystals. The attacks occur without reference to eating, usually in the afternoon. They end suddenly with a feeling of palpitation. Ice locally, and bromides, do not influence the attacks, but caffein and digitalis seem to prevent them for some time. During the attacks the blood-pressure is low. Bunzel shows that one may explain the attacks by supposing, with Martins, there is a primary lowering of the tone of the heart-muscle, and that, as in Knoll's experiments, the sensory nerves of the heart are irritated and the irritability of the vagus lowered. On the other hand, the vagus might be inhibited by some other cause, and the frequent beats and consequent short diastole of the left ventricle cause congestion of the right ventricle and the veins of the general circulation.

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**The Larvæ of Flies as the Cause of a Chronic Pseudomembranous Enteritis.**—Most cases in which insect larvæ have been thought to come from the intestinal tract have been of short duration, the larvæ found by accident, and their origin often doubtful. A remarkable exception is reported by HENSCHEN (*Wiener klin. Rundschau*, 1896, No. 33). A peasant, while bathing in a brook, drank some of the muddy water. He noticed later that the water was full of red insects. In two or three weeks he had abdominal pain and diarrhœa, without vomiting. The diarrhœa continued, interrupted by attacks of severe constipation. There were seven or eight pale watery stools daily, with masses of mucus sometimes many feet long. At times blood was passed. Usually larvæ were passed with the stools. Various remedies were used, but mostly only with the result of increasing emaciation. The most effective remedy was a combination of kamala, kousso, and malefern. This caused the expulsion of large masses of larvæ, and was followed by long-continued relief. The larvæ were cylindrical, articulated, without feet, measured 7 to 16 mm. in length, and 1 to 2 mm. in thickness. The heads were black. The animals were lively and vigorous. The entomologist Aurivillius assigned them to a species nearly related to the common house-fly.

[It is well known that in certain species of flies the larvæ are capable of reproducing larvæ.]

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**Congenital Cirrhosis of the Liver in Syphilis.**—MARCHAND (*Centralblatt für allg. Path.*, 1896, No. 7) reports a number of cases of syphilitic livers in infants. The most common change was the one in which there are irregularly distributed foci of degenerated liver-cells, with small-celled infiltrations. Such cases eventually lead to the distorted syphilitic liver. In

one case, however, the liver was almost normal in macroscopic appearance, but microscopically showed a widespread and intense round-celled infiltration in the portal capillaries. This form probably passes into a genuine hypertrophic cirrhosis in later life.

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## SURGERY.

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**The Surgery of the Peritoneum.**—Mr. FREDERICK TREVES has devoted a great deal of time to the study of the peritoneum, and his observations have been an important factor in the development of the present advanced state of the surgery of this structure. We therefore naturally read with great interest his "review" of this subject (*British Medical Journal*, 1896, No. 1870).

Mr. Treves advocates the simplest possible technique in the preparatory details and during an operation. While not sacrificing any of the essentials, he avoids those extravagant measures that savor more of ostentation than a rational interest in the welfare of the patient. The author still retains his confidence in the value of iodoform as a part of the dressing of wounds.

The advance made in our knowledge of peritonitis has been mainly in an appreciation that all the varieties hitherto considered as different forms are due to infection and are practically identical in their consequences. The constitutional symptoms of peritonitis are due to septic intoxication, and in the fatal cases death is due to blood-poisoning. Great harm has been done in the past, the author believes, by what has been termed "the toilet of the peritoneum." In removing accumulations or tumors from the abdominal cavity every precaution should be taken not to disturb the peritoneum beyond the immediate area of the operation, by the appropriate use of gauze-pads, etc., so that extensive flushing or sponging will be unnecessary. Peritonitis not involving the "small intestine area," subphrenic, iliac, and pelvic, is apt to be localized, and the surgical treatment of the affection in these situations is very successful. If the "small intestine area" is involved, however, the inflammation spreads rapidly and evidences of profound constitutional poisoning precede the usually fatal issue. The results of surgical interference in these cases, Mr. Treves says, "at the best are not brilliant, and it is evident that the treatment of this terrible complication must still incline toward that desirable prevention which is better than cure."

The author still retains the term "perityphlitis." While he is perfectly familiar with the comparatively much greater frequency of primary inflammation of the appendix, the evidence before the profession warrants the assertion of the existence of true peritonitis due to primary ulceration of the cæcum. This does not refer to epithelioma, actinomycosis, or tuberculous disease, but to non-malignant, non-parasitic ulceration of the bowel. Those cases are also excluded in which perforation of the cæcum is secondary to an appendicular abscess.

Our knowledge of the etiology of this disease, the author states, has not been added to by the "exuberant analytical discourses of some recent writers." He advances the suggestion that the process is comparatively simple. "A catarrh leading to ulceration would appear to be the commonest factor, and it is this condition which precedes that stricture of the appendix which is so frequently discovered. . . . Foreign bodies, seeds, and fruitstones play practically no part in the etiology of perityphlitis." The very few instances of real foreign bodies found in the appendix have been mostly small shot, pins, fragments of nut-shell, and bristles. Very many of the concretions are wonderfully accurate representations of certain seeds and fruitstones, and in some cases only division of the foreign body will reveal its true nature.

The statistics of Miles F. Porter, which give the common death-rate at about 14 per cent., are quoted. These figures, the author states, must have been derived mainly from hospital cases. He would place the general death-rate for all classes of cases at about 5 per cent.; but it may reach 30 or 40 per cent. in those complicated with abscess.

The subject of a perityphlitic abscess, it is stated, is by reason of that abscess, in the majority of instances, cured of his trouble should he survive. Sometimes an abscess that has been drained closes, only to open again, or a sinus may remain unhealed; but a second "perityphlitis" is very rare in these cases.

In regard to the question of treatment Mr. Treves says: "I have no reason to alter the opinion expressed some years ago that in dealing with cases during an attack an operation is seldom called for before the fifth day. Terms too strong cannot be used to condemn the practice of immediate operation; by that I mean the exposing of the appendix as soon as the diagnosis has been made. There is no sound basis for this procedure in either the pathology or the clinical prospects of the affection. It is not to be disputed that a fatal attack may commence mildly, and that it is not possible to foretell the degree of an attack by its mode of onset. The course of perityphlitis is, however, not so erratic as some maintain, and careful observation of each movement of the disease is not an unreliable basis for treatment. It is true that some intense attacks end in death in forty-eight hours; but if the whole range of the disease be reviewed, it is safe to say, with precision of language, that these terrific phases of the malady are exceedingly rare on the one hand and are not difficult to recognize on the other.

"In such extreme examples an operation cannot be done too soon. The assurance that simple incision is attended by a death-rate of 18.18 per cent. is not an encouragement to operate as a matter of routine. I need not add that evidence or strong suspicion of the presence of pus indicates immediate

interference, and a like course is clear should the swelling continue to increase with no abatement of the fever and other symptoms.

"When an abscess is evident or suspected the locality of the incision must be determined by the area of dulness and of resistance. Should the wound be made too far to the inner side as to miss the collection and open the peritoneal cavity, that incision should be closed and a fresh incision made at a point where the evacuation of the pus within the enclosed area can be effected. The incision should be free; the abscess-cavity is gently examined as to its position and extent, and information obtained as to the situation of diverticula. These diverticula can be cautiously opened up with the finger. No elaborate search should be made for the appendix. Such search means risk to the frail abscess-wall, and to that often feeble barrier of adhesions which isolates the pus from the general peritoneal cavity. Continued trouble may follow from a retained concretion, and as such a substance is usually easily to be felt, it should be sought for and removed. Should the diseased appendix actually present itself, it can be ligated and taken away. The high mortality accredited to this operation depends, I cannot help thinking, upon a blind resolve to excise the vermiform process at all hazards. The operation is concerned with the evacuation of an abscess, and those cases do best in which the least is done, provided that a free evacuation of the pus has been secured. The cavity does not need to be squeezed; it does not call for irrigation nor for sponging out, and least of all for scraping. As for drainage, nothing answers better than the iodoform-gauze drain properly cut and carefully introduced."

The risk attending the removal of the appendix in the period of quiescence, first proposed by the author in 1888, has been in his experience less than 1 per cent., and is therefore less than that of a recurrence of the inflammation. In the majority of cases, however, the attack is single, but we have as yet no reliable figures on this point.

The very interesting paper concludes with the following rational statements: "The treatment of a diseased appendix involves no new surgical principle and calls for no labored inventions. The treatment of the abscess is based upon those great general principles which underlie the treatment of all abscesses, and the removal of the little organ demands no departure from those accepted procedures which belong to the common lore of surgery."

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**Excision of the Tarsus.**—LAUDERER (*Cent. für Chir.*, September 5, 1896, No. 36) gives a new line of incision for reaching the tarsus and contiguous structures. The incision begins at the insertion of the tendo-Achillis and extends in the median line on the plantar surface of the foot down to the bone. It divides no vital structures, simply the fat, plantar fascia, and the flexor digitorum muscle in a line parallel to its fibres. The splitting of the tendo-Achillis upward will do no injury if it is necessary. By holding the parts apart with sharp retractors all the bones of the foot may be readily reached by the use of the periosteal elevator, and easily removed.

The position of the incision is very serviceable in the after-treatment, as drainage is good. A light antiseptic packing is useful to prevent the too early adhesion of the edges of the wound. The deformity produced is very slight and can be corrected by a thickened sole on the shoe. There is no

The administration of morphine in the early stages of the disease only masks its symptoms and delays the diagnosis of perforation, and as each hour's delay before operation, after perforation, vitiates and lessens the patient's chance of recovery, morphine should never be employed, but the patient should be operated upon as soon as the diagnosis of perforation has been made.

Of sixty-eight cases operated upon in the clinic of Upsala there were six with diffuse and nine with fibrino-purulent peritonitis. Of the six, two only recovered, while of the nine all but one recovered, and this patient was operated upon in a moribund condition. This difference in mortality marks sharply the difference in prognosis between these two classes of critical cases.

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**Osteoma of the Patellar Ligament.**—LEJARS (*Gaz. Hebdom. de Méd. et de Chir.*, February 21, 1897) reports an interesting case of pure osteoma situated in the patellar ligament, between the patella and tuberosity of the tibia. The tumor sprang directly from the ligament and had no connection with the patella or tibia. It was about the size of a walnut and made up of compact osseous tissue. Its removal was necessitated by its interference with the motion of the joint, which, although slight, weakened the joint.

The danger in its removal lay in the destruction of the patellar tendon; however, by a subperiosteal dissection, the tumor was removed, and after careful suturing together of the remaining portion of the tendon union was secured with no loss of function.

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**Traumatic Hemorrhage into the White Brain-substance Cured by Surgical Interference.**—BORSUK and WIZEL (*Archiv für klin. Chir.*, 1897, Band liv. Heft 1) reports a case of hemorrhage into the white substance of the brain, followed by aphasia, hemiparesis, and Jacksonian epilepsy, which was cured by surgical interference.

After the removal of a clot from the dura and the relief of acute symptoms the patient had repeated attacks of Jacksonian epilepsy. The reopened wound showed nothing abnormal, but a long hypodermatic needle passed deeply into the brain-substance drew out a blood-stained fluid. The dura was then incised, the needle again passed, and at the point from which the blood-stained fluid was withdrawn a deep incision was made down to the white substance. Bloody fluid and blood-stained contused white matter were removed, a strip of iodoform-gauze was inserted, and the wound sutured about it. The strip of gauze was removed twelve days after the operation, and with it about a teaspoonful of blood-stained fluid. The wound then closed and the patient made a complete recovery.

This observation leads to the following conclusions:

1. Extravasations of blood of traumatic origin can be removed from the brain-substance by surgical methods, as well as contused and destroyed brain-substance, and in the same manner pathological and circumscribed portions of brain-matter.

2. It is possible that extravasations of blood other than those of traumatic origin may be removed by surgical interference.

3. The brain does not resent surgical procedures more than any other part of the body.

## DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

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UNDER THE CHARGE OF  
J. SOLIS-COHEN, M.D.,  
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**Foreign Body Removed from the Larynx without the Use of the Mirror.**—DR. MAX THORNER, of Cincinnati, reports (*Journal of Laryngology, Rhinology, and Otology*, January, 1897) a case in which, with the aid of the Kirstein autoscope—practically a tongue depressor and nothing else—he removed from a young man a piece of chicken-bone nearly one and a half inches long, one end of which had seemed to be imbedded in the right ventricle, while the other end leaned against the ary-epiglottic ligament. This withdrawal had not even required the application of cocaine.

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**Suppurating Laryngeal Bursa.**—An instance of this rare lesion was recently exhibited to his class by DR. E. FLETCHER INGALS, of Chicago (*Medical News*, 1897, No. 7), which occurred in a man, aged thirty years, and had been noticed only two days previously. It was about an inch in diameter, movable, and lying just beneath the skin between the notch of the thyroid cartilage and the hyoid bone. It was treated by withdrawal of the fluid and injections of a solution of carbolic acid.

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**Bacteriologic Investigation in Chronic Nasal Catarrh.**—DR. EUGENE LARUE VANSANT recently read before the County Medical Society (*Philadelphia Polyclinic*, 1897, No. 11) a brief report of the results of a bacteriological investigation of the nasal mucus, with special reference to the presence of the Klebs-Löffler bacillus, in one hundred cases of chronic nasal discharge. This examination embraced one hundred and thirteen cultures taken from one hundred patients suffering with various forms of rhinitis; great care having been exercised to exclude all cases showing any of the well-known clinical signs of diphtheria. The bacilli of diphtheria were found in the discharges of twenty-six different patients, while three other patients furnished organisms closely resembling the bacilli of diphtheria.

Leaving out all consideration of the various other forms of organisms, other bacilli, cocci, diplococci, etc., it is remarkable that such a large proportion of diphtheria-bacilli should be found in these cases, taken as they come in an outdoor clinical service.

The diphtheria-bacilli were chiefly found in atrophic rhinitis, chronic purulent rhinitis, and nasal syphilis. In all the cases in which the diphtheria-bacilli were present the patients were in ill health; being listless, pale, and anæmic.

The result of future investigation with these cultures is promised in full at a later date.

**The Relation of Diseases of the Nose and Throat in General Medicine.**—The Lettsomian lectures now being delivered before the Medical Society of London by F. DE HAVILLAND HALL (*British Medical Journal*, 1897, No. 1884) are upon diseases of the nose and throat in relation to general medicine, and, to judge by the first one, are worthy of serious consideration not only of the general practitioner, but of the "Charlatanoide" who rushes into a specialty without any practical experience in general medicine.

After indicating the method in which many infectious diseases gain entrance by the nose and throat, attention is called to the occasional injurious effects from operative procedures upon the mucous membrane of these structures during the existence of epidemics, especially upon such people as are exposed to infection.

The conditions of the nose and throat and their involvements are then discussed in connection with diphtheria, smallpox, varicella, measles, röteln, scarlet fever, whooping-cough, influenza, enteric fever, and erysipelas in succession.

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**Correction of Saddle-nose by Insertion of Plates.**—At a recent meeting of the Liverpool Medical Institution (*British Medical Journal*, 1897, No. 1884) MR. THELWALL THOMAS presented a girl, fifteen years of age, upon whom he had operated seven months previously for saddle-nose deformity due to disappearance of the nasal bones in childhood from congenital syphilis. A piece of celluloid, modelled like nasal bones and possessing a well-marked keel on its concave surface, was inserted subcutaneously and pressed into position, the keel fitting between the nasal processes of the upper jaws, the lateral portions resting on these processes. The incision was made on the left side and closed by horsehair sutures. The imbedded celluloid did not appear to cause any irritation, and had of course greatly improved the personal appearance. The device was adopted in place of the many osteo-periosteal flap methods that had from time to time been described, all of which left marked cicatrices elsewhere.

[Some six months ago the compiler inserted a perforated platinum plate to correct a similar deformity in the person of a young medical gentleman. The nose and upper lip were detached from the underlying structures by the method of Roux; and then the plate, which was somewhat guitar-shaped, was fastened by means of a vertical pin in front, which was pushed between the remnants of the nasal bones, and one horizontal pin on each side, which was inserted into holes previously drilled into the nasal process of each maxillary bone respectively.

The patient has done well, and there has been no trouble from the plate, but for a long time there was marked anæsthesia of the external portion of the nose on the maxillary lines, which has only partially subsided, while there has been a constriction of the nasal orifices requiring the almost continuous presence of metal tubes to prevent atresia.

Curiously, one of the greatest comforts to the patient is the entire subsidence of a disagreeable nasal catarrh which had bothered him for many years.]

## OBSTETRICS.

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 UNDER THE CHARGE OF

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**The Influence of Neuroses on Pregnancy and Labor.**—In *La Presse Médicale*, 1897, No. 29, TARNIER discusses the influence of hysteria, epilepsy, and chorea upon pregnancy and labor. He excludes eclampsia as a neurosis because he considers it a toxæmia.

As regards hysteria, in a small number of cases pregnancy influences hysteria favorably. Very rarely, hysterical manifestations disappear during pregnancy; occasionally the attacks are less, while sometimes, on the contrary, they are much increased. It has been found by LANDOUZY and others that in the majority of cases hysteria is aggravated by pregnancy. So far as life and death are concerned, hysteria does not seriously complicate pregnancy; it exerts no unfavorable influence upon the progress of gestation, as it neither provokes abortion nor premature labor. So far as Tarnier's experience goes, it is sufficient, when necessary, to use the bromides in these cases.

As regards epilepsy, in one-fourth of the cases observed the epileptic woman is uninfluenced by pregnancy; in another fourth the epilepsy is aggravated, the attacks being more frequent and more severe, while death may occasionally ensue from a series of epileptic convulsions. In the remaining half of the cases the epilepsy seems less severe during the development of the fetus, the attacks being less frequent and less violent. Tarnier explains this improvement by the cessation of menstruation, which in many cases seems to provoke the epileptic attack. In some patients epilepsy appears during pregnancy, ceasing after delivery, but reappearing in subsequent gestation. Epileptiform paroxysms rarely occur during labor, and are readily controlled by chloroform.

A most interesting feature regarding epilepsy and pregnancy lies in the diagnosis of epilepsy and of eclampsia. It is necessary carefully to interrogate the secretions of the patient to make a positive diagnosis. Tarnier would rely upon bromide of potassium in epileptic pregnant patients, giving the drug in large doses, one to two drachms daily.

He also reports two cases of chorea complicating pregnancy. In the first, in three successive pregnancies, chorea supervened in each, the movements localizing themselves first upon the left, and then upon the right side of the body. The second case was one in which chorea developed during pregnancy, following a profound nervous excitement. The movements at first were limited to the left hand, but afterward became general; the patient declined treatment, and passed from observation.

Unlike hysteria and epilepsy, chorea constitutes a serious complication of pregnancy; the mortality has been variously estimated from 30 to 28 per



cent.; sudden death has been reported among these patients. In fatal cases death ensues from asphyxiation, the patients becoming paralyzed and often maniacal. In 20 per cent. abortion happens, or premature labor. Many of these women were rheumatic or chlorotic before pregnancy. The prognosis is always guarded, as the chorea may become severe and fatal. As regards treatment, those remedies usually given to choreic patients are employed successfully during pregnancy.

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**Acetone in the Urine of Pregnant Patients as an Indication of Fœtal Death.**—In the *Centralblatt für Gynäkologie*, 1897, No. 16, KNAPP reports, from the German obstetrical clinic of Prague, ten cases of fœtal death at various periods of gestation, in which, upon the day of labor, acetone was found in the urine; this substance was also present during the three days following labor. Some of these patients were syphilitic, but the influence of syphilis upon the presence of acetone is not determined. Half of the cases reported had suffered from syphilis, or were syphilitic at the time of pregnancy.

To ascertain the presence of acetone Jaksch's method was followed; this consists essentially in adding to the urine nitroprusside of sodium, and then either caustic soda or potassa to alkaline reaction. Acetic acid is then dropped into the fluid until the characteristic purple or violet color develops.

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**The Bacteriology of the Genital Tract in Woman.**—MENGE and KRÖNIG have recently published a volume upon this subject. (Leipzig, Arthur Georgi, 1897.) A review of this volume demonstrates anew the fact that the normal puerperal uterus is free from bacteria. In 19 per cent. of puerperal women who had fever, streptococci were present. So far as the streptococcus and staphylococcus of pus and the *bacterium coli commune* are concerned, they do not exist normally in the genital tract. The exact method of infection in many cases is hard to determine.

It is possible that bacteria endogenous to the skin may cause puerperal infection, if conveyed to the genital tract. The volume is of decided interest and merits the attention of those concerned in practical asepsis.

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**Pruritus, Vaginismus, Ovarian Irritation and Pernicious Nausea of Pregnancy Occurring in the Same Patient.**—In the *Centralblatt für Gynäkologie*, 1897, No. 12, SCHAEFFER, of Heidelberg, reports an interesting case in which a neurosis was perpetuated in spite of the occurrence of pregnancy; the patient first came under treatment for pruritus and vaginismus, and was considerably relieved by the dissection and complete removal of affected tissue. She next developed alleged pain over the left ovary, and shortly after this pregnancy occurred. She suffered during this time with excessive formation of acid in the stomach and most obstinate vomiting. She was finally carried to term, and had a spontaneous delivery; comparatively little pain was experienced during labor. After a sharp attack of diarrhœa, upon the eighth day, the pain in her left ovary disappeared. She subsequently made a partial recovery from the condition. The case is of interest as illustrating the temporary influence of pregnancy upon a neurosis, and also the

fact that neurotic patients suffer severely from gastric disturbance during pregnancy.

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**The Cause of Eclampsia.**—A further contribution to this involved subject is made by KOLLMANN in the *Centralblatt für Gynäkologie*, 1897, No. 13. Reasoning from the fact that the blood of eclamptic patients is unusually toxic, while the urine is often less poisonous than in many other cases, he has examined the blood to ascertain the presence of a poisonous body. He believes that globulin and the substances which result from its decomposition are largely concerned in the causation of eclampsia. Deficient excretion during pregnancy results in the gradual accumulation of this substance in the blood. He considers rapid delivery unnecessary unless nature has already begun the process. He lays especial stress upon the preventive treatment of eclampsia by suitable diet and stimulation of the excretions.

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**Three Porro Operations.**—In the *Transactions of the Obstetrical Society of London*, 1897, vol. xxxviii., SPENCER reports three Porro operations. The first was made upon a patient whose pregnancy had gone 299 days, and in whom fibroid tumors in the lower segment of the uterus rendered birth impossible. The patient was allowed to come into labor, and the head was forced strongly down into the fibroid tissue; the operation was performed under the spray. In order to check hemorrhage a pessary was placed upon the uterus and firmly pressed down; this device proved absolutely useless, and considerable hemorrhage ensued. It was difficult to extract the child on account of the firmness of the lower uterine fibroid segment. The child was asphyxiated, but revived. As the uterus did not contract, the wire loop was applied low down on the cervix, and the uterus amputated; it is stated that the patient probably lost about twelve ounces of blood. The patient made a good recovery, although her convalescence was interrupted by oozing from the stump, which required the use of sulphate of iron and of turpentine, and the application of a second wire loop. Nearly two months after operation the wound was perfectly healed. The patient nursed her child.

The second case was that of a primipara in whom an enchondroma of the pelvis rendered spontaneous birth impossible. The child survived the operation. The uterus was amputated above a wire loop. There was some oozing from the stump, and the patient died on the ninth day after delivery. On post-mortem examination interstitial nephritis and consolidation at the bases of the lungs were present.

His third case was that of a multipara who had epithelioma of the cervix; high amputation had been previously performed, and the vagina was closed by the cicatrix. Porro's operation was performed, and three years afterward the patient was free from cancer. The child survived. [It is difficult to understand the choice of Porro's operation in these cases when cœlio-hysterectomy with intrapelvic treatment of the stump and total extirpation of the uterus offers such excellent results. There can be but one reason with those familiar with hysterectomy for choosing Porro's operation, and that is the necessity for a rapid procedure. One of these operations consumed nearly an hour, and convalescence almost two months. In every particular, modern

hysterectomy before the commencement of labor, but at the period when pregnancy should normally end, is greatly to be preferred.—ED.]

**The Changes in a Retained Ovum and its Appendages.**—EDEN, in the *Transactions of the London Obstetrical Society*, 1897, No. 38, describes the changes which occur in a ripe and retained placenta. He also mentions those observed when the embryo is retained. His conclusions may be summarized in the statement that necrosis immediately begins, after foetal death, in the body of the foetus and the umbilical cord, the amnion, the extra-peritoneal chorion, and the *decidua vera*. In the placenta the maternal circulation is gradually arrested by thrombosis of the intervillous spaces. Necrosis of the various branches of the placental chorion occurs as they become shut off from the maternal blood, and fatty and calcareous degeneration is found in the necrosing tissues.

**Lactosuria in Nursing-mothers.**—Those who examine the urine of large numbers of pregnant and puerperal women not infrequently find traces of sugar, although no evidence of malassimilation or of diabetes can be discovered. This sugar is usually found to be lactose, and its presence is explained by PAVY (*Lancet*, April 17, 1897) as follows: he believes that in the case of nursing-mothers and cases of lactose formed in the mammary glands the lactose may be eliminated through the urine. This substance is to be distinguished from glucose by boiling the urine in sulphuric acid and applying the copper-test. It is curious to observe that it is only when a "case of lactose is present that it affords a reaction in the urine. It is always abundant in the milk, but the tissues seem less capable than normally of breaking up this substance and eliminating it through the blood.

Pavy cites the case of a patient who was weaning her child because of dyspeptic trouble, accompanied by frequent micturition. The breasts were hard and lumpy, and the urine had a specific gravity of 1040, the copper-test indicating eight grains of sugar to the fluidounce. There was a family history of diabetes in the mother of the patient. The urine was of high specific gravity and lessened amount. Pavy found that the patient was drinking too little water, and that the sugar was lactose and arose from the cessation of nursing. The patient's diet was increased, and in a short time the sugar disappeared, the patient remaining in good health.

**A Successful Cæsarean Section.**—In the *British Medical Journal*, May 1, 1897, COUSINS reports the case of a patient at full term, deficient in mental development, with a lumbar curvature of the spine and a contracted pelvis. An unsuccessful attempt was made to extract the child by craniotomy. The situation of the placenta was diagnosticated by palpation before the uterus was opened. The womb was not lifted out of the abdomen, and sponges were placed about it to prevent the leakage of fluid. After the delivery of the child the uterus was closed with two rows of catgut stitches, and the hemorrhage arrested by pressure with sponges. The abdominal wall was united with three layers of continuous catgut and a superficial row of silk. The vagina was cleansed from clotted blood, and a tampon of iodoform-gauze inserted. The patient made an uninterrupted recovery.

## GYNECOLOGY.

UNDER THE CHARGE OF

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**Hemorrhage due to Syphilitic Growth in the Cervix Uteri.**—WOLTER (*Münchener med. Wochenschrift*, 1896, No. 20) reports the case of a woman who was infected by her husband and bore nine dead children. Six months after her last labor she began to have metrorrhagia, which became so profuse that she was in collapse. Examination through the speculum revealed a nodule on the right side of the cervix, extending upward into the canal; it bled easily on being touched. Under antisymphilitic treatment the patient was cured in three months.

**Discission of the Os Externum.**—ROSNER (*Centralblatt für Gynäkologie*, 1897, No. 8) describes a plastic operation which he has recently performed, the purpose of which is to maintain the patency of the os after discission. Lateral incisions are made with a blunt-pointed bistoury. Two narrow flaps of mucous membrane are then formed from the anterior lip and are turned into the angles and sutured with catgut, the raw surfaces left after removing the flaps being also closed. A strip of gauze is inserted into the cervical canal and between the edges of the wound, and the vagina is loosely tamponed. The gauze is removed in two days, and daily douches are given. Healing takes place in eight days, and the os remains permanently open.

MARS (*Ibid.*) has simplified the operation by first lifting flaps on either side of the os, then incising laterally, and simply restoring the flaps to their former position and suturing them as before described.

**Ovarian Tumor with Cancer of the Cervix.**—ZEISS (*Ibid.*) reports the following interesting cases:

Case I.—A woman, aged fifty-five years, who had ceased to menstruate at fifty, had had hemorrhages and watery discharges for several months. On examination carcinoma of the cervix uteri was recognized, with an ovarian cyst the size of a child's head. Vaginal hysterectomy was first performed (a single clamp being applied to the left broad ligament), when it was found to be impossible to remove the ovarian tumor *per vaginam*, as it was solid. The abdomen was opened and the neoplasm was enucleated from the right broad ligament. The patient made an afebrile recovery, but had two fistulæ in the left ureter, which necessitated the removal of the corresponding kidney a year later. She recovered and remained in perfect health. The ovarian tumor was not examined.

Case II.—The patient, aged forty-five years, had had menorrhagia for

eight months, with pelvic pains, pressure on the bowel, and rapidly declining health. Diagnosis, carcinoma of the cervix with intraligamentous ovarian cyst on the left side. Total vaginal extirpation of the uterus was performed, the organ being firmly adherent. As the operation was long and difficult and the patient was exhausted, it was decided not to remove the cyst. The recovery was uneventful.

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**Congenital Displacement of the Kidney in the Pelvis**—MÜLLERHEIM (*Ibid.*) reports the case of a woman, aged fifty years, in whom the uterus and rectum were displaced to the right by the left kidney, which was adherent to the sacrum. The congenital nature of the anomaly was proved by the absence of any evidence of inflammation, the normal arrangement of the renal vessels, and the shortness of the ureter. The practical importance of this anomaly was demonstrated by cases in which rupture of the parturient uterus has been caused by the dystocia due to the displaced kidney. Others have been reported in which the organ was mistaken for an ovarian tumor.

This condition, which is due to faulty development of the Wolffian duct, is to be distinguished from movable kidney, in which the organ was originally in its normal position. Dystopia of the kidney is really the result of an arrested development, the organ remaining in the position which it occupied in the embryo. Accompanying congenital defects in the uterus and adnexa are quite common.

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**Pelvic Hæmatocele Associated with Cancer and Tuberculosis.**—GARDNER (*Montreal Medical Journal*, January, 1897) reports two cases which he regards as unique in his experience. Whether the vascular changes leading to the effusion of blood were the result of the malignant disease or simply coexisted with it was not certain. In one case abdominal section was performed for adenocarcinoma of the ovary, in the other for tuberculosis of the tubes. There was no evidence of ectopic gestation in either instance.

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**Operative Treatment of Pruritus Vulvæ.**—DIRNER (*Centralblatt für Gynäkologie*, No. 5, 1897) reports the following case: a multipara, aged sixty-five years, who had reached the climacteric twenty years before, had suffered for three years with itching and burning of the external genitals so severe that she was unable to sleep. The clitoris and labia majora were dry and cracked. There was no sugar in the urine. As medicinal treatment failed to give relief, the writer excised the affected tissue according to Sänger's method, from the mons to the fossa navicularis, including the clitoris, the wound being closed with sutures of silver wire and covered with iodoform-collodion. Primary union occurred, and the patient was discharged cured at the end of two weeks, the itching having entirely ceased.

The writer believes that pruritus vulvæ, when due neither to diabetes nor to the micro-organisms present in an irritating vaginal discharge, is really a dermatoneuritis, as described by Sänger, due to subacute inflammation of the papillæ and fibrosis of the bodies of Pacini, Krause, and Meissner, and can, as a rule, only be cured surgically.

## PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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**Bacteriuria in a Child.**—Under this title CLOPATT, of Helsingfors (*Revue Mensuelle des Maladies de l'Enfance*, October, 1896, p. 480), reports a case observed in a delicate girl of five years. Six months before symptoms referable to the bladder were observed she had suffered from a persistent diarrhoea lasting for two months. This was shortly succeeded by pertussis, which had reached the stage of decline when it was noticed that she had irregular evening rise of temperature with vomiting, independent of the paroxysms of her whooping-cough. Attention was now directed to the urinary organs by the fetid odor arising from the urine. Examination of the external genitals showed no disease, but urine drawn by sterilized catheter had a fetid, almost putrid odor, showed an acid reaction, and was cloudy but not opaque in appearance. After repeated filtration the liquid became clearer, but still showed a cloud when shaken. Microscopically, few leucocytes were found; but numerous freely motile rod-bacteria, which proved to be the *bacterium coli commune*.

Under daily lavage of the bladder with solutions of nitrate of silver, varying from 1 to 2000 to 1 to 1000, the urine became clear, free from odor, and sterile in about two weeks.

In this case the etiology is obscure, but it is probable that the attack of enteritis was responsible for the infection, since the *bacterium coli commune* existing in the liquid stools might readily reach the bladder through the urethra in a female.

It is remarkable that the colon-bacillus, which is in general pathogenic for the urinary tract, could be present in the urine in such a concentrated form without provoking cystitis. Krogus believes that the lack of conditions affecting the integrity of the mucosa of the urinary tract, such as would be caused by retention of urine or by calculus, accounts for the harmlessness of the bacterium in such cases, and that patients suffering from bacteriuria are especially liable to cystitis if exposed to unfavorable influences affecting the urinary tract.

The author advises antiseptic lavage, especially for children, since he believes that so dangerous a drug as salol could not be safely given in doses necessary to prevent the further development of the bacterium.

**Presence of the Loeffler Bacillus after Ablation of the Tonsil.**—LICHTWITZ (*Société de Biologie*, March 9, 1896) has made cultures of exudates formed upon the surface of the wound after ablation of the tonsil by the electrothermic loop, and in eleven out of twenty-seven cases he has found

the Klebs-Loeffler bacillus; in two cases the bacillus was present alone, and in nine was associated with the staphylococcus, streptococcus, leptothrix, or micrococci. With the sixteen other patients there were no diphtheria-germs, but divers other micro-organisms. The condition of those patients bearing the Loeffler germ differed in no respect from that of the others, and in all of the cases the wound healed equally well without the need of specific medication in the diphtheritic cases.

**Putrefaction of Proteids in the Stomach.**—Though much attention has been paid to the fermentative changes in the carbohydrates which are met with in the stomach, but little study has been given to the abnormal fermentative or putrefactive process which occurs at the expense of the proteids of the food. Among the products of this process hydrogen sulphide,  $H_2S$ , is not infrequently met with and is particularly disagreeable because of its offensive odor.

A case of this type, in which hydrogen sulphide putrefaction was a prominent feature, has been carefully studied by STRAUSS—*Berliner klinische Wochenschrift*, 1896, No. 18. Bacteriological examination of the stomach-contents disclosed the presence of a germ corresponding closely to the characters of bacillus coli communis—it grew characteristically on gelatin and agar, produced gas and acid when grown in sugar-broth, coagulated milk with production of acid, produced indol in sugar-free broth, and on potato formed a somewhat brownish, abundant growth. It was furthermore ascertained that bacillus coli communis regularly produces hydrogen sulphide in detectable quantity when grown in an abundant amount of ordinary agar or in pepton-water, and in pepton-broth in an atmosphere of hydrogen.

The symptoms of the case varied somewhat, and it was found that a peculiar relationship existed between the production of hydrogen sulphide and lactic acid formation. At the beginning of the illness, when the symptoms were severe, hydrogen sulphide was present in considerable quantity, but no lactic acid was detected; but later, when the symptoms had subsided somewhat, lactic acid was present, while hydrogen sulphide was not found. In seeking an explanation of this fact it was found that the addition of grape-sugar to stomach-contents undergoing the hydrogen sulphide fermentation brought this quickly to an end with a coincident abundant formation of carbon dioxide as the result of fermentation of the sugar. This suggests, of course, that in the sugar the bacillus coli finds a more easily assimilable food than in proteids, and we have thus an explanation of the well-known fact that the administration of carbohydrates tends to lessen proteid putrefaction in the stomach.

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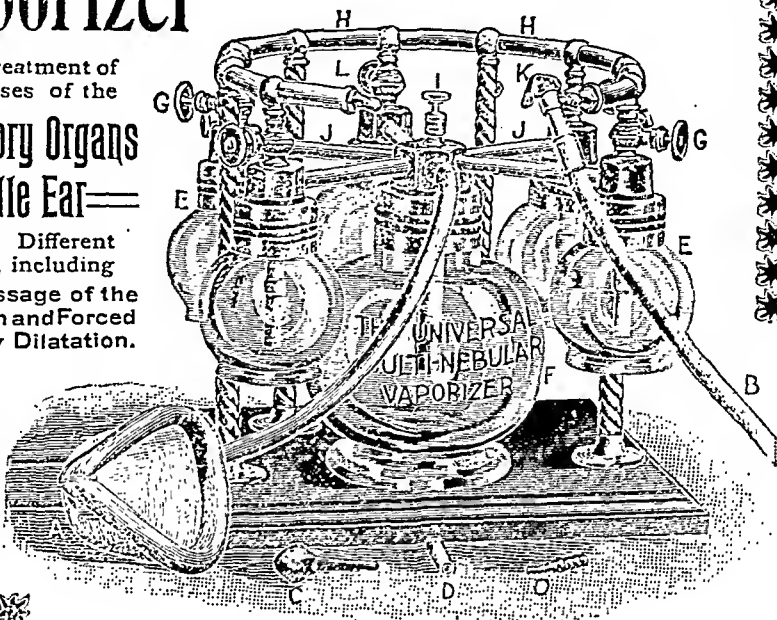
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*Professor of Pharmacology and Materia Medica of the Faculty of Medicine of Paris. Director of the Laboratory of the Consulting Committee of Public Hygiene of France.*

PARIS, February 12, 1897.

"The collections of disintegrated or broken down vesical or renal calculi which forms the subject of the following analysis and researches, were sent me by Doctor Edward Chambers Laird, resident physician Buffalo Lithia Springs, Virginia, U. S. A. They were discharged by different patients after the use of the mineral water of Buffalo Lithia Spring No. 2 for a variable time.

"I advise here from the experience of Doctor Laird the use of this mineral water, which has had with him a happy influence on the disintegration of the calculi and their elimination. It is to demonstrate this that he has requested me to make this analysis.

"The collections of the disintegrated calculi submitted to my examination were eight in number.

**SPECIMEN OF CALCULI "A."**—These disintegrated renal calculi are very numerous, and present themselves in the forms of grains of *various sizes (from that of the size of a pin to that of a pea)* of reddish yellow color, very hard and nucleus in the center. They are thus composed: Urates of ammonia—for the greater part; free uric acid—small quantity; carbonate of ammonia and magnesia—small quantity.

**CALCULUS "B."**—This disintegrated vesical calculus presents itself in the form of many fragments of a granular aspect of a greyish white color. *They are easily broken, and the texture of the fragments show that they are porous throughout.* Chemical composition: Urates of ammonia—for the greater part; carbonate of ammonia and magnesia—in small quantity.

**CALCULUS "C."**—Vesical calculus reduced to crystalline powder, granular, of a greyish white color, rather friable. Chemical composition: Phosphate of ammonia and magnesia—for the greater part. Carbonate of lime—small quantity. Oxalate of lime—very small quantity.

**CALCULUS "D."**—Vesical calculus thoroughly disintegrated, fragments many and angular, granular aspect, of a rather fragile consistence of a greyish white color. Chemical composition: Bicalcic phosphate—for the greater part (fusible directly to the blow pipe). Oxalate of lime—small quantity. Carbonate of ammonia and magnesia—small quantity. Xanthine—very small quantity.

**CALCULUS "E."**—Disintegrated renal calculi, many polyhedral fragments, rounded at the angles, consistence hard, color yellowish red. These calculi are hard and appear formed of concentric layers. Chemical composition: Uric acid—nearly the whole part. Uric pigment—(acide rosacique.)

(SIGNED) A. GABRIEL POUCHET.

*A portion of report omitted for lack of space.*

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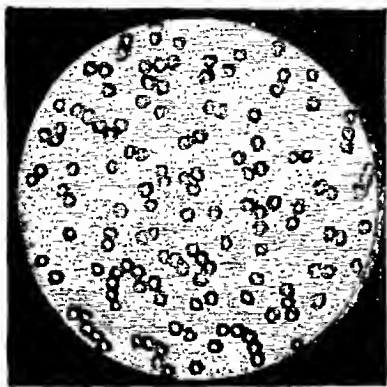
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# The Uric-Acid Theory of Gout and Rheumatism.

---

In the *British Medical Journal* (Dec. 28, 1895) Dr. Alexander Haig says that the failure to comprehend the invariable connection between the precipitation of uric acid into the tissues on the one hand, and a rheumatic or gouty inflammation of those tissues, on the other hand, is as much due to preconceived ideas and ignorance of the chemistry of uric acid as was the ancients' ignorance of the earth's motion and of the circulation of the blood. He makes bold to say that every drug that has ever been used with benefit in acute rheumatism in the past and every drug still to be discovered that may be used with benefit in the future will be found to do good *in direct proportion to its power of dissolving and eliminating uric acid*. Once these simple facts about the causation of rheumatism are generally recognized, he adds, its prevention will be so simple and so certain that the disease will become quite a rare one.

Salts of lithium have long been considered most suitable for eliminating uric acid, but their solvent action largely depends on the form in which they are administered. Lithium carbonate is almost useless, inasmuch as in the stomach it is converted into lithium chloride, which of all the lithium salts is the least able to combine with uric acid, and, moreover, is only absorbed to a limited extent. In this connection it may be pointed out that in the so-called natural lithia waters, the lithium is always found in solution as chloride or sulphate, both of which salts have practically no solvent action on uric acid. The benefit derived from these waters in some cases must be due solely to the large amount of water consumed. Alkaline treatment is not to be recommended. There is no necessity for rendering the urine alkaline, and there is even no objection to its remaining slightly acid (von Noorden). It is important, however, to restore the normal alkalinity of the blood and to keep the uric acid in solution in the urine. The best means of doing this is by the administration of vegetable acids or acid salts. If the vegetable acid be combined with lithium, a salt can be obtained which will restore the alkalinity of the blood and at the same time eliminate uric acid and retain it in solution in the urine.

Of the acid salts so far prepared, Tartarlithine, first recommended by Dr. E. C. Kirk, of Philadelphia, is by far the most useful. In addition to its solvent action on uric acid it possesses marked diuretic properties (Kirk and Mendelsohn). According to Professor Von Noorden, among twenty-one patients suffering from uric acid diathesis who were treated with vegetable acids, only two had a relapse in the course of a year, although previously all of them used to have attacks nearly every fortnight. The usual dose was from thirty to sixty grains daily. Two of the Tartarlithine tablets may be given in plenty of water three or four times daily.

In this connection Dr. Haig has shown that certain drugs diminish the solvent power of the blood for uric acid, and among them are potassium citrate, ammonia, lactic acid, arsenic and digitalis. It should be noted that ammonium urate is one of the most insoluble salts of uric acid.

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RAPIDLY OCCURRING HEMIPLEGIA IN ACUTE  
LEAD-POISONING.<sup>1</sup>

By J. M. DAcosta, M.D., LL.D.

ON November 10, 1896, I was asked by Dr. Theodore Gruel to see a case of paralysis of rapid onset and obscure origin. I found the patient to be a lady, thirty-five years of age, a brunette of fine physique, unable to walk, and scarcely able to stand without assistance. She had been still more helpless, but lately had been improving. Her previous history was one of almost uninterrupted health, the only illness being an attack of pneumonia four years ago, followed by albuminuria, from which she recovered on going to a southern climate. She never complained of anything, but, on questioning as regards susceptibilities, spoke of being susceptible to poison-vine. She spent the summer at the seashore, and came back to her home in the best of health. Shortly after her return it was determined to paint some rooms in the house, though not the one in which she slept, and the house throughout became filled with the odor of fresh paint. She began, almost from the first day, to complain of headache, and three days after the painters had been at work the headache had become so violent and she felt so ill that she sent for her family physician, Dr. Gruel. He found her much worse than had been supposed. Her speech was thick; the tongue was slowly protruded and deviated to the right; there had been vomiting. The right arm and leg were much impaired in their motion, the leg more so than the arm, and this loss of power was preceded by a feeling of numbness. The right side soon became still more helpless, and the patient was forced to remain in bed. Shortly after the right side was affected, numbness and a sense of coldness on the left side were complained of; but there was never any motor weakness on that side. The sense of coldness and numbness on the left side yielded in about one week to alcohol-sponging and to frictions with a Turkish towel, and her general

<sup>1</sup> Read before the College of Physicians of Philadelphia, January 6, 1897.

condition became decidedly better under repeated free purgation with sulphate of magnesia and under strychnine. In the progress of the case before I saw her it was observed that, while the paralysis of the right arm improved, things dropped out of her right hand; that the eyesight was very dim and its impairment much complained of; that there were no pains in the arms or legs, or joints, or in the abdomen; that the urine, examined from the start, was of high specific gravity, 1025 to 1040, but free from albumin and sugar; that the temperature was normal; and that there were no psychical disturbances, to which, indeed, neither she nor any of her family had ever been liable. The mother, it was ascertained, had a very great susceptibility to poisons of all kinds.

When I visited Mrs. O. with Dr. Gruel for the first time, four weeks after the paralytic attack, I found a well-nourished woman sitting in a chair, but still hemiplegic. The right arm could be feebly moved, but the grasp of the hand was very weak; the right leg was powerless. There was neither wrist-drop nor foot-drop, nor tremor, nor muscular atrophy. No facial paralysis existed, and the tongue was protruded straight. The knee-jerks were exaggerated, that on the right side markedly so. There was also an increased reflex in the forearm, both on tapping the flexors and the extensors. In the course of the musculo-spiral, the radial, and the nerves in the legs no spots of tenderness were detected. There was no anesthesia to touch or to pain. Tactile sensation in the fingers of both hands was well preserved, and heat was readily distinguished from cold. The muscular sense was not tested, nor were the electric reactions, though I learned subsequently from Dr. Gruel that the muscles on both sides responded well to faradization, and that the electric sensibility was normal. There was no disease of the heart. The breath had a peculiar, mawkish odor, and, in a strong light, we found an undoubted bluish line on the gums, especially around the lower incisors on the left side.

Convinced that she was suffering from lead-paralysis, we placed her on iodide of potassium. The strychnine was stopped, the sulphate of magnesia continued as a laxative, and, after about a week of this treatment, the urine was sent by Dr. Gruel to Professor Fetterolf, of the University, for examination. The report returned says, "No albumin, but lead present."

On December 24th I saw Mrs. O. again, and learned from Dr. Gruel that her progress had been uninterrupted. There had been no return of headache; indeed, the headache had passed away a few days after the seizure. The grasp of the right hand was greatly improved, though it was still not so strong as that of the left. She could now play on the piano; not, however, as well with the right hand as with the left. The sensation to touch was good in both hands; the tactile sense, tested with sharp points, seemed perfect, and was as good in the right hand as in the left; there was no diminished temperature-sense in either hand. No disorder of sensation in the legs was discernible; the motion of the right leg was not quite restored; she still dragged it a little, but she walked unassisted, even with her eyes closed. The knee-jerks were good; they did not seem any longer exaggerated. A faint bluish discoloration was still noticeable on the gum of the lower jaw. The heart-sounds were distinct; the digestion was excellent; the eyesight was fully restored; indeed, her recovery was almost complete. She had been

taking 30 to 45 grains of iodide of potassium daily since our first visit together. This we directed to be decreased and soon discontinued, and strychnine to be substituted. Systematic massage and faradization of the affected muscles were to be employed.

I am induced to put this case on record by its extreme rarity. As a rule, the publishing of isolated instances of disease is of little value; but here is one in which a woman in robust health is in three days so completely poisoned by lead that she becomes paralyzed. The form, too, of the paralysis is most unusual and its onset remarkable.

Let us first take notice of the rapidity of the poisoning. Almost from the first there is headache; after three days' exposure, paralysis, preceded by some disorder of sensation, but without colic or other abdominal symptoms except vomiting and moderate constipation. Three days is a very short time for any sign of lead-poisoning to manifest itself in, even the ordinary one of colic. Yet here we have the nervous system at once affected without preceding colic or any of the usual general symptoms of lead-poisoning. As regards the nervous system being disordered without colic first happening, the case, although unusual, is far from standing alone. In 102 cases analyzed by Tanquerel des Planches in his classical work, fourteen had not antecedent colic. It is true that the paralysis he means is for the most part the usual one of the extensors of the arms. Trousseau mentions an instance of lead-paralysis in which there was no prior colic. In three of Tanquerel's<sup>1</sup> cases colic followed the paralysis. But in the rapidity with which the nervous system became involved, the case I have detailed is, I believe, without precedent; at least I am not able to find one. The most rapid cases I have any cognizance of are three alluded to by Tanquerel, in which, eight days after exposure to lead, paralysis followed; here, too, the context points to the ordinary local lead-palsy. In critically examining cases of rapid development we must not overlook the fact that a person may absorb lead slowly into the system for a long time, as through impregnated drinking-water or hair-dyes, and then another and different exposure, to fresh paint, for instance, produce sudden and overwhelming manifestations. This happened in the cases reported by Chapin,<sup>2</sup> in which acute symptoms of lead-poisoning showed themselves in the children of a painter after being only eight days in a freshly painted room, they having been, however, during two years exposed to a pot of white-lead kept in an adjoining room. In the case of Mrs. O. there was no history whatever of previous exposure, and, as already stated, she, with the rest of the family, returned from the seashore in perfect health.

The form of paralysis in the case under discussion requires special notice. It was that rarest of all as the result of lead—hemiplegia.

<sup>1</sup> *Traite des Maladies de Plomb*, t. ii. p. 19.

<sup>2</sup> *New York Medical Record*, 1884.

Moreover, it was not attended, at least not when it came under my observation, with anæsthesia, though the hemiplegic form is generally associated with hemianæsthesia. Cases of hemiplegia from lead are spoken of by some of the older authors, as by Stoll and Andral; Tanquerel<sup>1</sup> mentions having met with one. Raymond<sup>2</sup> describes a case in a man thirty-six years of age. The extensor muscles were first affected, and the palsy was preceded by violent colic. With the hemiplegia there was anæsthesia. Oliver<sup>3</sup> refers to an instance of right hemiplegia with aphasia. Often what is described as hemiplegia from lead is not a true hemiplegia, but is a general paralysis of incomplete character, especially in the legs, in which the loss of power has almost entirely or entirely passed off on one side at the time the patient is first seen. In the hemiplegia, as well as in the paraplegia, from lead the muscles of the upper extremities are generally more affected than those of the lower. Jacoud<sup>4</sup> tells us that this is the case in all lead-palsies in the proportion of 5 or 6 to 1. In children, however, as the observations of Putnam,<sup>5</sup> Sinkler,<sup>6</sup> and Newmark<sup>7</sup> prove, the palsy is more apt to be in the lower extremities. In this respect the instance of paralysis narrated in this paper is more like the lead-palsy of childhood than of adults.

From an analysis of the features of this case, and of the few that I am able to find recorded in medical literature, the clinical picture of saturnine hemiplegia of acute form is that of a hemiplegia suddenly, or rather suddenly, developed, prodromes of headache and weakness of extensor muscles in arm and leg having existed or not. The hemiplegia deepens after its onset; there is with it anæsthesia or some other disorder of sensation on one or on both sides. But this is capricious and apt to pass off before the impaired motion does. The hemiplegia is associated with excessive reflexes. This combination of symptoms is in itself significant, and is valuable, irrespective of the history of the case and the ordinary manifestations of the presence of lead in the system.

From these hemiplegias of acute or subacute origin we must separate those that come on where the system has been long impregnated with lead, and secondary changes in bloodvessels, heart, kidneys, or brain have been slowly wrought. A hardened vessel gives way, and cerebral hemorrhage with one-sided paralysis occurs. Instances of the kind are mentioned by Mathieu and Malibran,<sup>8</sup> and by Létienne.<sup>9</sup> Landowzy<sup>10</sup> details an autopsy in a printer who had right-sided hemiplegia and had frequently suffered from lead-colic. Besides the evidence of an old clot

<sup>1</sup> Op. cit.

<sup>2</sup> Med.-Chir. Trans., vol. lxxiii, 1890.

<sup>3</sup> Article Lead-poisoning in *Cyclopædia of Diseases of Children*, and *Boston Medical and Surgical Journal*, February, 1893.

<sup>4</sup> Medical News, July 28, 1894.

<sup>5</sup> Progrès Médicale, October, 1884.

<sup>6</sup> Bull. Soc. Anat., 1877.

<sup>7</sup> Gazette de Paris, No. 30, 1876.

<sup>8</sup> Pathologie Interne.

<sup>9</sup> Ibid., May 11, 1895.

<sup>10</sup> Arch. gén. de Méd., vol. i, 1892.

in the brain, a descending medullary sclerosis was found. In Monakow's<sup>1</sup> case, a printer, who had had chronic lead-poisoning for thirty-five years, a right-sided hemiplegia due to cerebral hemorrhage happened some months before death, and atrophic and sclerotic lesions existed in the upper part of the spinal cord. In Rosenthal's case<sup>2</sup> of right-sided hemiplegia in a house-painter an extravasation of blood on the left side of the brain, with rigidity of the arteries at the base, was observed at the autopsy. In the remarkable group of saturnine encephalopathies described by Berger,<sup>3</sup> to which Dr. Stewart called my attention, occurring in a family of potters, with an evident predisposition to nervous diseases and apoplectic seizures, there were four who, while suffering from chronic lead-poisoning, had hemiplegic attacks due, with one probable exception, to cerebral hemorrhage.

There is little difficulty in distinguishing the hemiplegias due to lead from other palsies produced by lead. Most cases of paralysis from lead-poisoning, with or without the familiar wrist-drop, are owing to a degenerative neuritis, and the bilateral character of the palsy in the arms, its gradual spread, should it become general, the wasting of the muscles, the localized pains, the impairment or loss of faradic irritability, are very significant. The knee-jerks and plantar reflexes are usually much weakened or lost in extensive neuritis due to lead; yet too much stress cannot be laid on this point as a mark of distinction, for, as Hale White's<sup>4</sup> case proves, they may be very active. With reference to the hemiplegias that occur in chronic lead-poisoning yet are not, strictly speaking, saturnine, but due to cerebral hemorrhage, they may be discriminated by the history of long-continued lead-poisoning; by the signs of diseased arteries, heart, or kidneys; and by the sudden and complete loss of motion in the apoplectic attack—much more complete than occurs in saturnine hemiplegia. On the other hand, the disturbance of sensation is absent, or far less pronounced in the apoplectic cases. As a rule, too, the electro-muscular contractility is not so well preserved, owing to the saturation of the system with lead; but the electrical reactions are not conclusive in distinguishing between these forms of hemiplegia in lead-poisoning, nor are the reflexes. On the whole, the distinction is generally not difficult. Yet that it may be so is proved by an instance mentioned by Duchenne as occurring in Trousseau's clinic, which that master regarded as purely saturnine. There was normal electro-muscular contractility and sensibility, and at the autopsy an extensive clot was found on one side of the brain.

In the instances of paralysis of acute onset, such as the one described

<sup>1</sup> Archiv für Psychiat., vol. x. Part 2.

<sup>2</sup> Elektro-therapie, ii. Aufl. 32. Beob.; also referred to in Nervenkrankheiten, p. 607.

<sup>3</sup> Berlin. klin. Wochenschr., March, 1874.

<sup>4</sup> Transactions of the Clinical Society of London, 1893.

in this paper, it is not likely that any structural disease in the brain other than local alterations of the circulation and some effusion exists. The disturbance is caused by the lead circulating in the blood and acting on motor centres or motor paths as a poison, directly, or by changes produced in the blood, though the further thought of a thrombosis or of minute embolisms from the altered blood suggests itself. We have no positive evidence in these hemiplegias that there is no anatomical change in the nervous textures; we can only reason from analogy from what has been observed in other encephalopathic affections of quick development that there is none. Thus, Oliver<sup>1</sup> extracted lead from the brain in cases of lead-poisoning in which death was rapid, but found the brain-substance pale, œdematous, and soft, with accumulation of subarachnoid fluid, and membranes normal, or the veins gorged. In Stewart's cases,<sup>2</sup> dying in convulsions, lead was found in the brain, but there were no marked signs of disease beyond those of congestion. Trimborne,<sup>3</sup> in a case resembling tubercular meningitis, found the brain to be intensely anæmic. The part of the brain for which lead has a particular affinity is indicated by the researches of Maier<sup>4</sup> to be the cortex.

This paper is offered as a contribution to a subject which, however ardently it has been worked at, still presents itself constantly in new or in complicated and rare forms.

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## ON THE TREATMENT OF GRAVES'S DISEASE BY MEANS OF THYMUS GLAND.

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DURING the last year and a half a number of cases of exophthalmic goitre treated by thymus gland have been published in the medical journals in various parts of the world. I have been frequently asked to give my opinion as to the value of this mode of treatment, which I have been employing in a certain number of cases for two years. I have hitherto refrained from doing so, because I was anxious to give the method a fair trial and was conscious that nothing was easier than to draw erroneous conclusions as to the effect of remedies in such a malady as Graves's disease.

Every physician who has had much experience of this disease will

<sup>1</sup> Med.-Chirurg. Transactions, vol. lxxiii. 1890.

<sup>2</sup> Phila. Med. Times, June and December, 1887, and January, 1889.

<sup>3</sup> Centralblatt für klinische Medicin, March, 1891.

<sup>4</sup> Virchow's Archiv, vol. xc.

agree with Möbius when he exclaims regarding the effects of drugs upon it, "*Wie viel Täuschung bereiten therapeutische Versuche!*" I think, however, the time has come when I should put on record some account of the cases treated by this method and endeavor to arrive at some conclusion as to whether the thymus gland has any decided therapeutic action or not on the symptoms or course of this disease.

My attention was first called to the subject by reading an account of a case, published by Mr. David Owen, of Manchester, in which great benefit was stated to have followed enormous doses of thyroid gland, the largeness of the dose having been due to a mistake on the part of the butcher. The dose amounting to one-quarter of a pound, I was convinced that so much thyroid was not likely to have been supplied by a butcher by mistake, and I pointed out to Mr. Owen that quite a large number of sheep's thyroids would be necessary to make up a quarter of a pound. Mr. Owen then, on investigating the matter, found that it was a thymus and not thyroid which had been given. Mr. Owen published a further account<sup>1</sup> of the case, stating this and endeavoring to explain the mode of action.

The total number of cases so far recorded, treated in this way, which I have been able to find, amounts to thirteen. I am able to add to this number two treated by Dr. Metcalfe, of Newcastle, of which he has kindly sent me the particulars, bringing the number up to fifteen. The cases treated by myself, which I propose to publish in this communication, amount to twenty.

The one symptom which, above all others, I have found almost quite uninfluenced by remedies of any kind is the rapid action of the heart. No drug with which I am acquainted can be depended on to reduce the frequency. Constantly, when the other symptoms have subsided and the general health has greatly improved, I have found the heart still beating quickly. If it were, therefore, found that under the influence of thymus the heart was conspicuously slowed down, I should attach great importance to this fact.

Next to rapidity of heart, the exophthalmos is the most obstinate symptom. I do not know of any drug which has any effect on it. True, it generally abates, sometimes entirely disappears, as the disease passes off; but frequently permanent prominence of the eyes remains. If thymus produced rapid diminution of exophthalmos, I should also attach great importance to this.

The effects of a drug on the thyroid gland are much more difficult to study. In the natural course of Graves's disease the goitre frequently progressively diminishes, and in a late stage no enlargement may be perceptible. On the other hand, it frequently fluctuates in size, enlarging at menstrual periods or under other conditions. While, therefore, thymus was being<sup>2</sup> given, if the goitre enlarged, I should not consider



the drug could have much specific action; and if, on the other hand, it diminished, I should not feel justified in attributing this result to the drug without other evidence.

I consider it very unsafe to draw conclusions from general improvement in the condition and state of nutrition of the patient. This so frequently occurs, whatever mode of treatment is carried out, as well as when no treatment at all is employed, that it must be considered in most cases as a natural result, and not as the effect of drugs.

It is idle to speculate as to the mode in which thymus influences the disease until it is established that it does influence it. Previously to trying thymus I had tried the effect of thyroid and several other animal tissues in this disease. I did not try the thymus on account of the fact that this gland is frequently found to be persistent in fatal cases.

From this fact I did not anticipate any likely therapeutic action. The last of my series of cases treated by thymus gland is specially interesting on account of the persistence of the thymus gland, and the fact that histological examination showed it to present the structure of a functionally active gland.

Those who are interested in speculations as to why the thymus should prove useful may read Mr. Owen's second paper, already referred to, or an article by Dr. Metcalfe,<sup>2</sup> who, starting with the assumption that the thymus is the specific for Graves's disease in the same way that the thyroid is for myxœdema, proceeds to give a very ingenious explanation of how it acts.

Before relating the results of my own experience I shall very shortly review the cases recorded by others.

CASE I. Observer, D. Owen.<sup>1</sup>—Male, laborer, aged forty-six years. Duration twenty years. Exophthalmos marked; goitre slight; pulse-rate 126.

*Treatment.* One-quarter pound of sheep's thymus daily for two days, and then, after a week, given in doses of a quarter of a lobe daily. Steady improvement. The exophthalmos and the fulness in thyroid region disappeared. Pulse-rate reduced to 76. Patient became able to do heavy work without the slightest discomfort. On discontinuing the treatment gradual return of some of the symptoms, viz., palpitation and loss of energy, which disappeared on resuming the thymus. The amount found necessary to keep him in health was one lobe once a week.

CASE II. Observer, J. Mikulicz<sup>3</sup> (Breslau).—Female, aged forty-four years. Duration many years. Exophthalmos to a high degree; goitre large since seventeen years of age; pulse 120–132; usual nervous symptoms; systolic murmur. Admitted to hospital for stridor and symptoms of tracheal pressure.

*Treatment.* Sheep's thymus at first in small, later in large doses; 375 grammes taken in six weeks. *Effects:* striking improvement; exophthalmos lessened; goitre unchanged; pulse-rate reduced 20–30 beats per minute; stridor and dyspnoea only troublesome on exertion; greater capability for exertion than for many years.

CASES III., IV., and V. Observer, R. H. Cunningham, M.D.<sup>5</sup>

CASE III.—Female, aged twenty years. Duration two years. Exophthalmos fair amount; goitre moderate; pulse 124; insomnia.

*Treatment.* Lamb's thymus slightly broiled (amount not stated). Improvement after a few days. She then went to a neighboring State, and it is not recorded whether she continued to take the thymus or not. Gradual improvement. Five months later no exophthalmos, no goitre, pulse 72, general condition excellent.

CASE IV.—Male, age not stated. Duration four years. "Prominent eyes;" goitre slight; pulse 100–110; severe insomnia.

*Treatment.* Irregular administration of lamb's thymus, slightly cooked, for two weeks. Result: eyes gradually became less prominent; pulse fell to 78; general condition improved.

CASE V.—Female, age and duration not stated. "Usual symptoms;" goitre marked; pulse 124.

*Treatment.* Twelve to fifteen 5-grain tabloids of thymus daily; goitre very considerably decreased in a week; pulse in two and a half weeks 96, but readily mounting to 120 after moderate exertion; increased energy and strength.

CASE VI. Observers, MM. Taty and Guérin<sup>6</sup> (Lyon).—Woman, age and duration not stated. Well-marked symptoms; goitre; mental trouble.

*Treatment.* One and one-half kilos of calf's thymus administered in two months. No effect on goitre, tremors, or nervous symptoms. Loss of weight 2.6 kilos.

CASE VII. Observer, Robert J. Edes, M.D.<sup>7</sup>—Female, aged thirty-four years. Duration a few months, but history of goitre cured by electricity several years ago. Prominent eyeballs; goitre small; pulse rapid and irregular; great nervous restlessness, bodily and mental.

*Treatment.* For eight months various remedies tried, without benefit. Pulse never below 104, but, on the whole, gain of flesh and diminution of restlessness. Then treated with dried aqueo-glycerin extract of thymus, 4½ grains per diem. Relieved, but no very obvious change in the symptoms in three weeks. Continued treatment three months: goitre less; pulse 92–108; restlessness diminished.

CASE VIII. Observer, Norman J. McKie, M.D.<sup>8</sup>—Female, aged thirty-nine years. Duration three years. Exophthalmos gradually increasing; never much enlargement of thyroid; pulse-rate generally 90 at least; symptoms soon yielded to rest and tonics in August, 1892. At Easter, 1895, treatment desired on account of prominence of eyes.

*Treatment.* Thymus-tabloids (5 grains), at first one, then two, and next three daily, after food. In three months exophthalmos nearly disappeared. Pulse-rate 75. On stopping treatment exophthalmos returned. Tabloids resumed, with noticeable benefit in a short time.

CASES IX., X., and XII. Observer, Arthur Maude.<sup>9</sup>

CASE IX.—Female, age not stated. Duration eight years. Every known symptom with great severity; goitre large and increasing; gastro-intestinal attacks severe and prominent.

*Treatment.* Thymus-tabloids (10 grains) twice a day for several weeks. No effect. Then 45 grains given per diem. Rapid improvement, but repeated relapses on leaving off the tabloids. Amelioration of all signs. No effect on goitre.

CASE X.—Female, aged thirty-nine years. Goitre since childhood.

No mention of exophthalmos. Symptoms: tremors, excessive muscular weakness, cardiac disturbance six years.

*Treatment.* Thymus-tablets (15 grains) twice a day for two months. Result: great improvement of all symptoms, especially tremor and loss of muscular power.

CASE XI.—Female, aged forty-seven years. History of Graves's disease at seventeen years of age, with complete recovery after a few years. Always emotional and excitable. Slight proptosis and occasional thyroïdal swelling, November, 1894. No disturbance of heart until January, 1896. Sudden death of husband in May, 1896, caused outburst of all the usual symptoms. Steady improvement under administration of fluid extract of thymus for two months. Dose not stated.

CASE XII.—Female, aged fifty years. Goitre since eighteen years of age. No signs of Graves's disease until the age of forty-six years. All the usual signs with various nervous symptoms. November, 1895, sudden profuse hæmatemesis, after rallying from which treated with 45 grains of thymus-tablets three times a day for a month. Remarkable improvement.

CASES XIII. and XIV. Dr. G. Metcalfe, of Newcastle-on-Tyne.

I am indebted to Dr. Metcalfe for permission to give particulars of these two cases, which have not, I believe, been previously published.

CASE XIII.—Female, aged forty-five years. Duration of main symptoms twelve months, but palpitation three years, since shock resulting from sudden death of her sister in her presence. Exophthalmos marked and goitre moderate; pulse 120; great emaciation and anæmia, along with the usual nervous and mental condition.

*Treatment.* At first bromide, belladonna, and arsenic with no benefit. Then sheep's thymus two ounces a day, slightly fried in butter, started April, 1895. After a month of this treatment distinct improvement. Seven pounds in weight gained between the middle of May and middle of June. By August, the signs of Graves's disease had almost wholly disappeared. Maximum pulse-rate 90; no palpitation; no exophthalmos; no enlargement of thyroid. In December, 1895, strong and robust, well nourished. The glands now only taken occasionally. No other medicines taken. When stopped no immediate effect, but after a month nervousness and palpitation return, subsiding on resuming the medicine. Very enthusiastic about the treatment and considers herself cured thereby.

CASE XIV.—Female, age and duration not stated. Marked exophthalmos; enlarged thyroid several years; palpitation and nervousness.

*Treatment.* Thymus gland ordered in September, 1895. In a month the thyroid gland was reduced to normal size, palpitation and nervousness had disappeared, and the ocular signs were gradually subsiding.

CASE XV. Observer, Charles Todd, M.B.<sup>10</sup>—Female, aged twenty-two years. Duration three years. Exophthalmos moderate; goitre two years, size not stated; pulse 156, irregular; insomnia and palpitation troublesome.

*Treatment.* No benefit from the drugs ordinarily employed. Thymus-tablets (30 grains a day) started September 30, 1895; gradually increased up to 100 grains a day. At the end of three weeks pulse 72, regular; exophthalmos less marked; goitre unaltered; improvement in general condition.

**SUMMARY OF PRECEDING CASES.** It will be seen from the preceding that the treatment was followed by considerable improvement in the patient in every case but one, viz., No. VI. In this case the calf's thymus was used in large doses, averaging about three-quarters of an ounce a day. In seven of the cases a very striking fall in the pulse-rate is explicitly recorded.

In three cases the exophthalmos disappeared, in one case it nearly disappeared, and in four cases it was lessened. In the remaining eight cases the result, as regards the eyes, is not specially mentioned.

As regards the goitre, in four cases in which it was large there was no change; in four cases no effect is noted; in three cases a slight enlargement disappeared; in two cases there was diminution in size; in one case the swelling was noted as never much, and in another as only occasional. Improvement in the general condition of the patient was noted in fourteen.

As regards the dose given, it varied between  $\frac{1}{4}$  lb. and  $4\frac{1}{2}$  grains in the day. Lamb's or sheep's thymus was given in six cases, in four slightly cooked and in two raw. In six cases thymus was given in the form of tabloids, and in two cases in the form of fluid extract. In the remaining case calf's thymus was given raw.

Large doses in two of the cases were successful where small doses failed. Two of the English firms who make thymus-tabloids inform me they use the calf's thymus, so that it is probable where tabloids were given that it was calf's thymus which was made use of. I have ascertained that the preparations used in Cases VIII., IX., X., XI., and XII. were derived from the calf. It must be borne in mind, in judging of the remedy, that it is probable it has been used without benefit in a considerable number of cases which have never been published. On this account it would be hardly fair to compare these cases, as I shall presently compare my own, with cases treated by other methods.

Dreschfeld,<sup>11</sup> in a recent article on Graves's disease, remarks that he has tried thymus gland in three cases without any marked benefit. Möbius,<sup>12</sup> in his recent work on Basedow's disease, mentions that he has treated several patients with slightly cooked calf's thymus for a shorter or longer time. They improved, but not more or sooner than under other modes of treatment.

I shall now proceed to relate the cases which I have treated myself, and shall then discuss them as a whole.

**CASE XVI.**—Woman, aged thirty-six years, admitted to St. Thomas's Hospital August 25, 1894. Goitre one year; palpitation three years; moderate proptosis; pulse 104; slight tremors; nutrition good. The patient was kept in bed for a week and the pulse quieted down gradually, successive records being 96, 84, 82, 76.

On September 2d she was given calf's thymus lightly broiled, but

could eat only a little of it. The same evening her temperature rose to 100.2°, having previously been normal.

On September 3d and 5th she had some more thymus, and on September 6th she had some freshly expressed thymus juice. Her pulse on these days was 84, 78, and 72, while her temperature kept normal.

On September 7th and 8th she had half a thymus; on the 12th six ounces of thymus; on the 13th four ounces; and on the 15th four or five ounces were administered. Her pulse on the 8th was 60; on the 10th, 72; on the 13th, 76.

On the 17th she had thymus again. She said she felt much better and stronger. No pain under the heart, no attacks of palpitation. The thyroid was slightly less prominent.

On September 20th, however, the pulse-rate was again 100; on the 21st, 112; and on the 22d, 96.

The patient left the hospital on the 27th, feeling better, the thyroid a little smaller, pulse-rate 76, but otherwise *in statu quo*.

Between September 1st and 8th she lost two pounds, but between September 8th and 25th she gained six pounds.

She was recommended to continue the treatment on returning to her home in Luton. I wrote subsequently to my friend, Dr. W. B. Tomson, of Luton, to inquire how she was getting on, and he informed me that the patient had not gone on with the thymus and could not be persuaded to do so, and that she had altered little since leaving the hospital.

CASE XVII.—C. K., single woman, aged twenty-five years. Illness commenced at the age of twenty years, with weakness and anæmia. About this time she had a great deal of anxiety and nervous strain, and swelling in the throat made its appearance. The swelling, at first small, quickly increased to more than its present size. A few months later she was very much troubled with diarrhœa, weakness at the knees, and palpitation. Her eyes at this time began to get prominent. She continued in bad health for about eighteen months. As she recovered, she began to suffer with severe pains at the back of her eyes, which came on once a week and have continued to trouble her up to the present time. She was so far restored to health that she was able to return to business for some eighteen months, but in November, 1894, all her symptoms returned, the swelling in the neck, proptosis, and palpitation being once more conspicuous.

She attended at St. Thomas's Hospital as an outpatient for a short time, and was admitted under my care as an inpatient on July 3, 1895. Her condition was then as follows: nutrition fairly good; eyes, marked proptosis; Von Graefe's sign present; considerable enlargement of thyroid, the right lobe being greater than the left; no bruit on auscultation; very rapid cardiac action, 160 to the minute, irregular and extremely forcible; no murmurs at apex; systolic murmur at the base; fine tremors of hands well marked; skin darker, especially on back, than ordinarily with persons of her complexion. After a few days' rest in bed the pulse quieted down to 102.

She was ordered one calf's thymus gland daily in the form of cold watery extract. She had this for the first time on July 8th, and subsequently had it fairly regularly for over three weeks.

The usual amount employed was eight or nine ounces. The patient expressed herself as feeling better while taking the thymus extract, but none of the objective symptoms appeared to be affected; thus the

exophthalmos, the goitre, the tremors, the looseness of the bowels, and the heart-rate remained as before. Thus on July 29th the pulse was 112. The patient left the hospital on August 4th, practically *in statu quo*.

The patient wrote to me on April 17, 1896, saying she was now feeling very much stronger, but some weeks was much better than others. The throat and eyes remained about the same, the heart palpitated very much at times, and she still suffered from shakiness and pains at the back of the eyes.

CASE XVIII.—Male, aged twenty-seven years; very marked exophthalmos; emaciation; rapid cardiac action; pulse 120, but no obvious thyroid enlargement. The patient was very tall and weighed 148 pounds.

He came under treatment on December 18, 1894, and was ordered three 5-grain tabloids of thymus three times a day, and 10 minims of tincture of belladonna. After fourteen days he said he felt stronger and better. Pulse 116. On January 1st he was ordered fifteen 5-grain tabloids a day. On January 15th pulse 120. Better on the whole, but some days well, others worse. He was then ordered belladonna and bromide. On February 19th his pulse was 96. He had considerably improved. His weight had gone up to 163 pounds, a gain of over 14 pounds.

CASE XIX.—C. T., female, aged forty years, attended September 4, 1895. She had a moderately enlarged thyroid, and complained of palpitation, trembling, attacks of fainting. No exophthalmos. Her pulse-rate was 112. For two months she was treated with a quinine and iron tonic; then, for two months, with belladonna and digitalis, and then again with an iron tonic. No distinct improvement in the goitre or symptoms. The goitre, indeed, slightly increased.

On March 11, 1896, I put her on extract of thymus, 5j b. d. After six weeks' treatment no marked effect had been produced.

CASE XX.—Female, aged twenty-nine years, married. She had been under my care and observation four years with well-marked signs of Graves's disease. Duration of disease five and one-half years. Goitre, exophthalmos, palpitation, etc., all well marked. Course of disease characterized by remissions and exacerbations. In January, 1894, premature confinement at five or six months, followed by flooding, after which symptoms of disease were aggravated. Eyes very prominent, thyroid gland a good deal enlarged, tremors, breath very short, palpitation.

On September 25th pulse 104. Ordered three 5-grain tabloids of thymus three times a day. On October 2d pulse 96. General condition better; five 5-grain tabloids ordered three times a day for a week. Patient, however, did not attend again until January, 1895. She then said she had been better for a time, but her condition was again *in statu quo*.

CASE XXI.—Female, aged twenty-four years. *Forme fruste*. Small goitre; rapid cardiac action; pulse 120; tremors; no exophthalmos.

Ordered one 5-grain tabloid of thymus three times a day. This she took for eight weeks, at the end of which time no obvious improvement had taken place. Pulse still 120. She continued the treatment for six weeks more, without obvious effect.

CASE XXII.—A. B., female, aged thirty-four years, attended May 9, 1896, complaining of weakness and nervousness, prominence of the

eyes, want of energy, etc., for the last six weeks. She had a moderate enlargement of the thyroid; her neck measured thirteen and one-half inches in circumference. The neck had been swollen for four or five years. The exophthalmos was only slight. Pulse 126; weight 98 pounds, formerly 114 pounds.

She was treated with sod. phosph., gr. xv t. d., and extract of thymus (1 in 1), ʒij b. d. These she took for a month, and felt better for them, but there was no striking change in her condition.

CASE XXIII.—E. E., female, aged twenty-two years, attended February 19, 1896. Her throat had been enlarging for four years, and for the same time she had suffered from palpitation and nervousness. Her eyes had been prominent for two years. Pulse 122, regular. Moderate uniform enlargement of thyroid; neck-circumference thirteen and one-quarter inches; exophthalmos moderate. There was very considerable œdema of the legs. The urine contained a third of albumin. Her weight was 112 pounds.

*Treatment.* For the first seven weeks I treated her with tincture of belladonna, ℥x; sod. phosph., gr. xv t. d. The œdema soon disappeared and the amount of albumin in the urine greatly diminished. She increased 8 pounds in weight. The eyes became less prominent, but the heart still continued rapid. I next treated her with sod. phosph., gr. xv; extract of thymus, ʒj t. d. She took it for fourteen days without benefit. On May 6th I noted "Not so well; no strength; ravenous appetite; very thirsty; pulse 130. Thyroid considerably enlarged, measuring five inches across. Weight 121 pounds." On May 20th I again put her on the extract of thymus, which she took for two months, and appeared decidedly to improve in general condition. Her pulse quieted down to 98. The goitre slightly diminished, the neck-circumference becoming twelve and one-half inches.

CASE XXIV.—M. E., female, aged twenty-three years, single, servant, under my care off and on for nearly four years.

She first came under my care at the Royal Free Hospital in September, 1892. She had then been ailing about two months, having for that time felt tired and unfit for work. She had been noticed by her friends to have become irritable and nervous, although naturally not at all so. Her father had died suddenly about six months previously, and this had much affected her at the time. No previous illness; always strong and well until present attack. History of rheumatism in the family, patient's mother having had rheumatic fever three times, and sister having aortic valvular disease. Her condition at that time was as follows: "Nutrition fairly good; weight 106 pounds, in dressing-gown. When last weighed, about two years previously, she scaled 126 pounds. Eyeballs noticeably prominent, giving patient a wild, startled look. Palpebral fissure decidedly increased. Sclerotic seen both above and below the iris when patient looks straight in front. Glistening of conjunctivæ. Eyes quite covered by eyelids when the latter are closed. Von Graefe's sign absent. Thyroid moderately and uniformly enlarged; breadth four inches. Circumference of neck twelve and one-quarter inches. Uniform brown pigmentation of the whole body except the face. Heart rapid and irregular. Pulse 112.

The patient was kept in bed and treated with belladonna and a variety of other remedies. At first the thyroid increased somewhat in size, and then gradually diminished. The patient steadily increased in

weight from 106 pounds to 120 pounds. Throughout the whole period of her stay in the hospital, extending over four months, the pulse kept up about the same rate, between 112 and 120.

She subsequently attended under me as an outpatient at St. Thomas's. Very little exophthalmos and little enlargement of the thyroid remained, but the pulse-rate continued rapid.

On November 14, 1894, she returned, having been absent nine months. She stated she had not been so well lately. Her pulse was 120. No difference in eyes or thyroid. Weight 133 pounds. Face plump. I ordered her thymus extract (1 in 4),  $\text{m}_{xx}$  t. d., and tincture of digitalis,  $\text{m}_{v}$  t. d. She came back in a fortnight saying she felt better while taking the extract, the supply she had been given having, however, only lasted a week. Pulse 118. The mixture and extract were repeated for fourteen days. December 12th, pulse 138; both medicines repeated for three weeks. January 2d, pulse 120; she continued to take the same medicines for three months longer. She slightly increased in weight, going up to 138 pounds.

No marked difference was ever observed in the rapidity of the pulse. She was quite certain herself that the medicines made her feel stronger and better and less nervous.

CASE XXV.—Man, aged forty years, engine-fitter; extremely marked case. Duration of symptoms six months. History of five attacks of influenza. Shock twelve years ago; squeezed between railway buffers.

In July, 1894, patient found his neck increasing in size so that he was obliged to purchase larger collars. Within ten days the circumference increased from fourteen to sixteen inches. He also found that the exertion of walking up hill caused shortness of breath. Toward the end of September he sought medical advice, but gradually became worse. The breathing especially became more difficult, and he experienced a sense of suffocation, sometimes filling him with a dreadful sensation as if a strong hand were gripping him by the throat. As the neck was not increasing in circumference he thought the enlargement must be going on internally, and feared the consequences might be fatal. Walking up hill became almost impossible. On October 14th he was no longer able to continue his work, and became an inpatient of the hospital about October 27th. He was kept in bed and under treatment for a month; the throat grew smaller and breathing easier, but he lost flesh and strength during that time. He then attended as an outpatient under me.

On December 5th I noticed extreme exophthalmos, upper lid much retracted. Emaciated; weight, which was formerly 140 pounds, now 118 pounds; marked tremors; extremely fidgety manner; thyroid uniformly and considerably enlarged; circumference of neck sixteen inches; pulse 160; great thirst and large appetite; urine normal; profuse sweating; skin generally dark, muddy-colored. He was exceedingly weak and was obliged to have assistance to get about and to visit the hospital.

He was ordered extract of thymus (1 in 4),  $\text{m}_{xx}$  t. d. On December 19th, when next seen, he was found to have lost six pounds in weight. His pulse was still very rapid, 150. The urine now contained a small amount of albumin. The thymus extract was increased to  $\text{ss}$  t. d. On January 2d he was found to have lost still more in weight, being



only 108 pounds. Pulse still 150. Urine, trace of albumin. The thyroid enlargement distinctly less. Neck now measured fourteen and one-half inches in circumference. Exophthalmos quite as well marked. Thymus extract continued in small doses.

On January 16th he reported that he had been bad all the past fortnight, especially with palpitation of the heart. Pulse 180 at first, 130 later. He felt he was getting weaker and weaker, and feared every visit would be his last. Thymus extract continued.

On January 30th still very weak and ill. During the last fortnight he had slight convulsive attacks which alarmed him very much. Further loss of two pounds in weight. Pulse 122-136. Urine, a trace of albumin. The thyroid enlargement still less. Neck now only fourteen inches in circumference.

He was ordered potassium bromide, gr. xv; tincture of belladonna,  $\mathfrak{m}$ . xv; tincture of sumbul,  $\mathfrak{m}$ . xx. A.M., P.  $\mathfrak{z}$ j t. d. in addition to the thymus extract. On February 14th, much better. No more convulsive attacks; weight as before; pulse 145; medicine and thymus repeated.

On February 28th looking and feeling decidedly better. Skin clearer; pulse 126; urine free from albumin; weight 107 pounds.

From this time the patient steadily improved. He regained weight, became stronger, less nervous, and had less and less palpitation. His pulse, however, continued rapid.

On April 24th I noted weight, 127 pounds; pulse 118; urine, no albumin; feeling fairly strong and able to be out of doors at work again.

He continued to take the same medicine until August 17, 1895. Weight now 130 pounds; pulse 92. A change was made in his medicine, the bromide and sumbul being omitted; but he did not feel so well, and after three weeks he was put back on the original mixture, the thymus being discontinued.

On October 12th his weight had further increased to 133 pounds. Pulse 110; eyes less prominent; face clearer and fuller. He looked very much better. Neck-measurement fourteen and one-half inches. At his own request he was given the thymus extract,  $\mathfrak{z}$ j t. d., in addition to the mixture.

December 14th, continuing in fairly good health. Weight 136 pounds; pulse 88. Thyroid enlargement rather greater again; circumference fifteen inches.

On January 4th the thymus extract was increased to  $\mathfrak{z}$ ij b. d. January 25th, weight 137 pounds; pulse 86. February 15th, pulse 80; neck-circumference sixteen inches, and thyroid gland certainly larger. Belladonna and bromide mixture discontinued. Weight  $136\frac{1}{2}$  pounds. March 7th, thymus suspended. Pulse 88. Ordered red marrow extract and sodium phosphate. March 21st, not so well since medicine changed. Red marrow stopped. April 18th, pulse 104; weight 136 pounds; neck-circumference sixteen inches. Ordered extract of thymus (1 in 1),  $\mathfrak{z}$ ij b. d. May 9th, pulse 118; weight 133 pounds; neck fifteen and one-half inches. May 30th, pulse 110; weight 133 pounds; neck fifteen and one-quarter inches. Has been working hard during the last week and feels more shaky.

CASE XXVI.—Woman, aged forty years. First came under treatment July 16, 1892. Usual symptoms of Graves's disease. The com-

plete original notes of her case have been lost, so that I am unable to give exact particulars as to the previous duration, causation, etc. The most marked feature of the case was the patient's extreme nervousness, characterized by tremulousness and excitability. Exophthalmos decided, but not extreme. Von Graefe's sign present. Thyroid enlargement moderate. Cardiac action rapid, 112 to 130. Heart, no evidence of organic disease. Patient was treated with belladonna for several months, with some benefit to her nervousness and general health. Various other drugs were tried, but she said none suited her so well. She looked and felt better and improved in nutrition. The eyes became less prominent, but the pulse remained persistently rapid, being generally 120.

I did not see her from April, 1893, to December, 1894, and during that time she enjoyed better health than she had done for a considerable time before she began to attend.

In December, 1894, I noted "moderate exophthalmos; slight Von Graefe's sign; pulse 136, tremulous; no distinct enlargement of thyroid now; weight 107½ pounds; skin muddy-colored."

I prescribed for her extract of thymus (1 in 4), mxx t. d. She continued to take this for four months. Her pulse during this time was generally much quieter than it had been while she attended previously, the records at intervals of three or four weeks being 104, 88, 92, 104. She looked and felt better, and her skin became clearer. Her weight remained the same. She attended subsequently from November, 1895, to March, 1896, when her heart was again troubling her and beating at the rate of 120 to the minute. For the first fortnight I treated her with extract of thymus, 3j t. d.: her pulse fell to 96. I then treated her without the thymus, and her pulse varied between 120 and 108; but this fact was not surprising because she had sustained a fracture of the radius, which no doubt aggravated her symptoms.

CASE XXVII.—A. S., female, aged twenty-five years; married four years; one child living, aged three years; one dead, born five weeks before admission.

Palpitation commenced four years ago. Soon afterward the eyes commenced to get prominent, and gradually became markedly so. During the same time she has, in addition, been troubled with shortness of breath on exertion, nervousness, trembling, cramps in the legs, giving way of the knees, and diarrhœa. She has lost flesh to a considerable extent.

On admission, October 19, 1895, eyes very prominent. ("Three weeks previously the left quite came out, and had to be pushed back again.") Von Graefe's sign well marked. No enlargement of the thyroid, but some prominence of the upper part of the sternum. When the patient was previously under my care in July, 1894, there was then slight enlargement of the thyroid. Heart 126, quite regular; sounds healthy; abdomen much pigmented; walls flaccid, due to recent confinement; hands show fine tremors; urine normal.

During the first ten days the patient was kept at rest in bed, but no medicine was given. The pulse-rate varied between 100 and 134, the latter rate being noted on the 30th. She complained of palpitation occasionally, but otherwise had no subjective symptoms.

On October 30th she commenced to take 3j of (1 in 4) thymus extract three times a day, being equal to 45 grains of thymus daily. On the 31st she complained of palpitation of the heart, which had kept her

awake most of the night. The pulse was very irregular, every fourth or fifth beat not being conducted to the wrist. Cardiac action 118.

On November 4th she complained of pains in the eyes and of dimness of sight; and on November 5th, on waking, she said she was unable to see at all. She also complained of aching pain on each side of her neck in the region of the thyroid gland, and also of pain at the back of the neck at the same level. On November 6th the thymus extract was discontinued. On the 8th the patient was ordered extract of belladonna, gr.  $\frac{1}{4}$  every six hours. She was kept in the hospital until December 29th.

From November 8th to November 30th the pulse, on the whole, was less rapid than previously; but during the whole of December it was rapid, varying between 130 and 102. No real improvement occurred in the eyes. The patient, however, before leaving the hospital stated she felt better, and that she did not get so easily tired as formerly.

The thymus treatment in this case was only carried out for a week, and the patient altogether had little more than three-quarters of an ounce of thymus during that time. It was discontinued because the patient seemed to be rather worse while taking it than she was before.

CASE XXVIII.—R. N., woman, aged twenty-five years, single, servant. Date of first attendance, May 8, 1895. Well-marked signs and symptoms of Graves's disease. Duration eighteen months. Decidedly better last nine or ten months than during first period of illness. Has had no treatment except for a fortnight for palpitation of the heart and weakness after an attack of influenza in January, 1890. Eyes, very marked proptosis; dislocation of right eyeball two months ago; got it back herself; never spasm; the right eyeball appeared to be rather the more prominent; Von Graefe's sign very well marked; thyroid gland uniformly and considerably enlarged; pulse 120 to 125; palpitation moderate; trembling has accompanied the palpitation; no marked loss of flesh; weight 110 pounds; looks well nourished; subject to flushings and heats, and feels better in cold weather; appetite good; no disturbance of digestive organs.

Patient was treated with tincture of belladonna,  $\mathfrak{m}\mathfrak{x}$ , potassium bromide, gr. xx t. d., for fourteen days without any change. Then, in addition, she was ordered extract of thymus (1 in 4),  $\mathfrak{z}\mathfrak{j}$  every night. She continued taking both for seven weeks. She said she felt decidedly better, but no change was apparent either in the proptosis, the size of the thyroid, or in the pulse-rate. The thymus extract was continued for five months longer, an alkaline tonic being given in addition. The thyroid certainly diminished in size, the neck losing an inch in circumference. The patient lost a few pounds in weight. The pulse continued rapid, 126, and the eyes remained quite as prominent. Her general condition certainly improved, and she felt stronger and capable of greater exertion.

CASE XXIX.—A. W., aged thirty-two years, married; one child, aged nine years; first attended August 25, 1894. She presented all the signs of Graves's disease in a marked degree. There was marked proptosis; the thyroid was much enlarged, the right lobe more so than the left; the pulse was 140; and the patient suffered much from palpitation.

She stated she had always been very nervous, and had suffered from headache, palpitation of the heart, and trembling, since childhood. Her

eyes had been prominent for the last two or three years, but she could not say definitely when they first began to protrude. In the beginning of 1894 she had violent pain in her chest, especially affecting the heart and left side. She consulted a doctor, and he presently noticed that the neck was beginning to swell. In addition to palpitation, she was much troubled with profuse sweating.

The patient had returned two years ago from Brazil, where she had been resident for eight years. During the last two years of her residence a revolution was going on, and the patient was much frightened by the firing, etc.

When a child she had measles, scarlet fever, and English cholera. She had also then frequent attacks of epistaxis. One of her brothers died of epileptic fits.

For the first five weeks the patient was treated with a mixture containing 5 minims of tincture of digitalis, which was taken three times a day. Her pulse-rate was as follows: September 8th, 116; 22d, 156; 29th, 84.

The exophthalmos was certainly less on September 29th than it was when she first attended, but the other signs were unaltered.

On September 29th she was ordered extract of thymus,  $\mathfrak{m}\mathfrak{x}\mathfrak{x}$  t. d.; tincture of belladonna,  $\mathfrak{m}\mathfrak{x}$ ; inf. gent. comp.,  $\mathfrak{z}\mathfrak{j}$ . A fortnight later the latter was changed to potassium bromide, gr.  $\mathfrak{x}$ ; inf. gent. comp.,  $\mathfrak{z}\mathfrak{j}$  t. d., as the patient complained of weakness of accommodation. She went on taking the thymus extract and the second mixture until January 12, 1895.

The heart continued to act rapidly, sometimes very much so. The trembling and sweating remained to a marked degree. The patient herself, however, stated that she felt very much better. The thyroid certainly diminished very considerably in size.

On January 12th the mixture was changed to potassium bromide, gr.  $\mathfrak{x}$ ; tincture of belladonna,  $\mathfrak{m}\mathfrak{x}$ ; inf. gent. comp.,  $\mathfrak{z}\mathfrak{j}$  t. d.; and the thymus was continued as before. During the next two months the patient was troubled a good deal with looseness of the bowels. She lost exactly fourteen pounds in weight between her first attendance and March 2d. On this date her pulse was 126; the thyroid enlargement was noted as only slight and the proptosis moderate. She now ceased attending.

On her return six months later, October 5, 1895, she considered herself now quite well. She was able for ordinary household duties. She had nearly regained her former weight, the proptosis and the thyroid enlargement were scarcely noticeable, but the pulse-rate was still too quick, being 104.

I have seen her several times since, when she has brought a sister to consult me, and she has appeared to have continued in good health and considers herself quite cured.

CASE XXX.—G. W., aged thirty-nine years, railway inspector, first attended February 29, 1896, presenting all the usual symptoms of Graves's disease. Duration of symptoms seventeen years. Twenty years ago he noticed swelling of the neck, which gradually increased. He first wore fourteen and one-half inch collars, then fifteen, now sixteen and one-half inch. At times, with improvement in his health, he has noticed diminution in the size of the swelling. He began to suffer from palpitation of the heart in 1879, which has continued more or less

ever since. His eyes, which were always somewhat prominent, have been decidedly more so during the last seven or eight years. He has had tremors of the hands and feet throughout life, but these became especially noticeable in 1883. Any excitement aggravates both the tremor and the palpitation.

Previous to the onset of illness he was fireman on an engine for three years, during twelve months of which time he had great cause for anxiety, as the driver was passionate and intemperate. His illness had never incapacitated him for work, and he had had no treatment. He has been married seventeen years, and has three healthy children. One of his sisters is mentally affected.

He now complains of cough, which he has had all through the last winter, as well as for several previous winters in succession. At irregular intervals paroxysms of coughing occur, and continue until retching is induced, whereupon the paroxysm ceases and the cough disappears for several hours. These attacks exhaust him very much. He suffers from them at intervals of a month or so.

During the last twelve years he thinks he has lost weight very much. Twelve years ago he weighed 135 pounds; last summer 127 pounds; now 118 pounds.

He was a dark-complexioned man with bronzed face and neck, markedly protruding eyes, and sunken cheeks. Exophthalmos distinct, but not extreme. Von Graefe's sign was well marked; the thyroid gland was considerably and evenly enlarged; neck-circumference at level of cricoid fourteen and one-half inches; marked throbbing of the carotids; heart-action rapid, 120; area of cardiac dulness increased to the left, extending one and one-half inches external to the nipple in the sixth space; no extension to the right of the sternum; no bruits; pulse 120, feeble; lungs normal; no enlargement of liver or spleen; urine 1030, acid; no albumin or sugar; no swelling of legs.

*Treatment.* For the first seven weeks he was ordered sodium phosphate, gr. xv t. d., with tincture of belladonna, m. v., for the first fortnight. He was seen once a fortnight, and said he felt better each time.

On April 18th his pulse, as before, was 120; the circumference of his neck had increased half an inch; his weight was 124 pounds. I then ordered him, in addition to the sodium phosphate, to take two drachms of extract of thymus (1 in 1) every night.

Four weeks later I saw him again; he said he was feeling better generally. His pulse-rate and weight remained exactly as on the last occasion. The circumference of the neck had diminished to fourteen and one-half inches. Urine normal. He was ordered to continue with the medicine as before. On June 10th he was *in statu quo*: pulse-rate, neck-circumference, and weight as before. Two months' further treatment and observation showed no material change in his condition.

CASE XXXI.—Female, aged thirty-three years. This patient attended under me for six months in 1891. At that time moderate exophthalmos, moderate goitre, pulse 140, throbbing carotids, palpitation, pigmentation, tremors, nervous irritability. She improved under ordinary treatment. On April 17, 1896, she returned, saying her heart was troubling her very much. There was considerable enlargement of the thyroid, chiefly of the isthmus; pulse 100; no distinct exophthalmos. Treatment, 90 grains of thymus-tablets a day.

May 1st, pulse 90, thyroid as before. May 15th, pulse 98, thyroid

decidedly larger. May 29th, pulse 90, thyroid still larger. Heart still troubling her. The patient ceased attending after this visit, having, as I think, derived no benefit from the thymus treatment.

CASE XXXII.—Female, aged twenty-six years. Duration of disease five years. Moderate and uniformly enlarged thyroid; circumference of neck twelve and one-quarter inches; moderate exophthalmos; pulse 120; condition of nutrition fairly good. At the commencement of the disease exophthalmos and goitre much more marked than now.

*Treatment.* No treatment had been tried for two or three years. Patient was able to work as governess, but was anxious for something to relieve her nervousness. August, 1895, I ordered her tabloid thymus, tabloid thyroid,  $\text{ãã gr. v b. d.}$ , which she took off and on for about a year. She stopped them twice, on account of palpitation, and once could not get them for a month. I saw her again in July, 1896. The eyes and thyroid were as before. Her pulse was 68, but irregular; and, on examining the heart, I found it beating at the rate of 110. Her general condition was certainly not improved.

CASE XXXIII.—A. J., female, single, aged twenty-one years, consulted me August 17, 1895. All signs and symptoms of Graves's disease well marked. Her eyes became prominent about two and one-half years ago; the neck became swollen two years ago; and she became short of breath three years ago. There was no history of any exciting or predisposing cause, except the occurrence of a slight gas-explosion in the house where she was living, shortly before she became ill. Among the symptoms from which she suffered were irritability of temper, extreme restlessness, intolerance of heat, disturbed sleep, perspirations, giving of the knees, weakness of the legs especially felt on going up stairs or getting into a carriage, attacks of palpitation and trembling, cramps in the fingers and toes, attacks of diarrhoea, thinning of hair both on scalp and eyebrows, and change of its color to a lighter hue. Lately she had had a troublesome cough coming on in paroxysms. She was always abnormally thirsty and hungry. She was well nourished and weighed 136 pounds, her height being about five feet. A year ago she had wasted almost to a skeleton, but had more than made up for what she had lost. The degree of exophthalmos was very considerable, the sclerotic showing both above and below, between the cornea and the eyelids. This was so much the case that people would call out after her in the street. There was also considerable enlargement of the thyroid, equal on both sides. The isthmus was broad. The circumference of the neck was fourteen and five-eighths inches; at one time it reached fifteen inches. She observed that the neck sometimes increased in size with exertion. Her pulse-rate was 102. There was marked throbbing of the carotids. A systolic bruit was audible in the pulmonary region. She was slightly anæmic. There was no pigmentation of the skin, but she had noticed that last year her skin had a muddy, grayish color.

A remarkable feature of her case was hypertrophy of the legs. The circumference of the calves was fifteen and one-half inches, and above the knee she measured seventeen and one-half and eighteen and one-half inches. She stated they were much larger than they were formerly. She had to get the largest-sized stockings, and "take in" the feet. There was no pitting œdema. The catamenia were regular.

*Treatment.* I ordered her to take a 5-grain tabloid of thyroid and

one of thymus, night and morning. She remained under the care and observation of Mr. South, of Boston, Lincolnshire, who had sent her to me. She continued to take the tabloids for a year. I saw her again August 8, 1896. She was feeling very much better; the improvement, as will be seen, appeared to be chiefly subjective. During the first six months the neck went down nearly two inches, its circumference diminishing to thirteen inches. It, however, increased again after that, and now measured thirteen and three-quarters inches. She said she had not been troubled much about the neck, on account of feeling so much better. The thyroid remained considerably enlarged, although not so much so as before. In the first six months her weight went down nine pounds, but in the second she gained five and one-half pounds. Her eyes were certainly not so staring, and less sclerotic was visible. Her pulse was 133, but palpitation had come on just as she got out of her cab to ring my bell. On the whole, however, she was not nearly so much troubled with her heart as formerly. She was less irritable, better able to bear heat, and had no unnatural hunger or thirst. Her legs were much stronger, and her knees did not give way. The enlargement still continued as before, and the measurements were the same. The most troublesome symptom had been the paroxysmal cough.

CASE XXXIV.—Female, aged twenty years, single, first came under treatment November 6, 1895. She had then marked exophthalmos, very rapid cardiac action, pulse 146, moderate enlargement of the thyroid. She said she had no strength or energy. Nutrition good. The thyroïdal swelling and the other symptoms had only been present fourteen days. No history of shock or worry. No previous illnesses.

For fourteen days she took an alkaline tonic, without alteration in her symptoms. November 20th, pulse 138; weight 115½ pounds; urine normal. Ordered extract of thymus (1 in 4), 5j; extract of thyroid (3 in 2), gr. j t. d. November 27th, pulse 132. Ordered double the amount of thymus. December 11th, pulse 142; weight 124½ pounds. December 18th, condition the same; pulse 128; thymus and thyroid discontinued. Ordered tincture of belladonna, m.x; potassium bromide, gr. x t. d. January 1st, weight 137 pounds; pulse 124. January 15th, weight 120½ pounds; pulse 152; weaker and more nervous. Ordered extract of thymus, 5j t. d., in addition to mixture. January 29th, general condition better; good deal of pigmentation about the face; pulse 136; weight 121 pounds.

CASE XXXV.—Female, aged thirty-one years, single, housemaid, came under treatment November 9, 1895. Died January 19, 1896. When I first saw her all the usual signs of the disease were very well marked. She stated that she first commenced to suffer about five years previously. In the winter of 1890 a walnut-sized swelling appeared on the right side of the neck, in the situation of the thyroid gland. This soon increased in size, and the other side also became swollen. The swelling did not remain uniform, but sometimes was larger than at others. In August, 1895, the swelling was said to have quite disappeared on both sides. For about three weeks it remained quite away, and then suddenly grew again, larger than before. The eyes became gradually prominent, but this was not noticed until about two years after the appearance of the goitre. She had suffered from attacks of palpitation, ushered in by cramps in the hands. Everything has seemed a trouble to her. She has suffered from headache at the top of the

head and across the eyes. She stated she had been very bad in the summer of 1895, and had lost flesh very greatly, but between then and November she considerably improved.

When I saw her in November the goitre was of a considerable size, the right lobe being about the size of a Tangerine orange, and the left being about half that size. The exophthalmos was pronounced, but not extreme; the pulse was 128, and the tremors were very marked. Her weight was 116 pounds. She was ordered liquid extract of thymus,  $\mathfrak{zj}$ ; liquid extract of thyroid,  $\mathfrak{m} \vee \text{t. d.}$  This was equivalent to 45 grains of thymus and 15 grains of thyroid in twenty-four hours. On November 16th the pulse-rate was 140; on the 23d it was noted that the thyroïdal swelling had become much larger. On this date the thyroid mixture was discontinued, and extract of belladonna,  $\text{gr. } \frac{1}{4} \text{ t. d.}$ , was given instead. On November 30th it was noted that the patient was very tremulous and had difficulty in breathing, while the thyroid was larger. The pulse was 154. The weight had fallen to 111 pounds. The patient was ordered liquid extract of thymus,  $\mathfrak{zj} \text{ t. d.}$ , in addition to the belladonna. She took this for a week and then discontinued coming for a time. On January 4th she attended again; her pulse was 142; she was very tremulous; her weight had now fallen to 89 pounds. She looked thin and ill, and I arranged that she should be admitted to the hospital without delay. She did not consider herself to be very ill, and a week elapsed before she entered the ward. All the symptoms were well marked, the degree of emaciation being the most noteworthy feature. The pulse-rate varied between 148 and 160. The thymus extract was continued for a few days, but was stopped, as the patient suffered from nausea. On January 16th she complained of pains all over her, and of a feeling as if she were going to be strangled. Her temperature rose slightly, and she had complete anorexia.

On the 19th she died. I made an autopsy next day. The body was extremely emaciated. There was generally darkening of the skin, especially marked on the face, abdomen, and legs. The thyroid gland was uniformly enlarged, each lobe being about the size of a hen's egg. The vessels on the surface were numerous and highly injected. The thymus was persistent, and was spread out over the upper part of the pericardium, forming a layer about one-quarter of an inch thick. A histological examination of the thymus was made by Mr. Walter Edmunds, F.R.C.S., who found it structurally identical with ordinary thymus tissue, containing the usual lymphoid cells and corpuscles of Hassall. There appeared to be no doubt that it was functionally active during life.

**SUMMARY AND CONCLUSIONS.** Of the twenty cases I have now recorded under my care, treated by the thymus gland, one died, and in six no improvement was observed. In thirteen cases there was some improvement. In none of these, however, have I observed any such decided effect produced on the most important symptoms, and on the progress of the disease, as could lead me justifiably to conclude that the thymus had any great therapeutic activity. For the sake of comparison, I propose to contrast the progress of these twenty cases with a similar number treated by other methods.



In the beginning of this paper I stated that the symptom which, up to the present time, I have found most intractable is the rapidity of the pulse-rate. One must, of course, avoid the error of taking the diminished frequency resulting from rest as a result of a remedy. In my cases I have endeavored to avoid this fallacy. In twelve of the cases no alteration in the pulse-rate was observed, and in two it increased slightly. In six it diminished; in all but one of these the diminution was only slight. In the one case in which there was very considerable slowing this improvement was only observed after the remedy had been taken for some months, and it seems doubtful whether the thymus had anything to do with the change, as the pulse-rate subsequently increased again while the remedy was still continued in large doses. Of the twenty comparison-cases no alteration in the pulse-rate was observed in eleven, and in two it increased slightly. In four cases there was marked but gradual diminution, and in three there was slight lessening of the frequency. It would therefore appear that, as regards the effect on the heart, there is nothing in favor of the thymus treatment.

As regards the thyroid gland, in only three cases was there a material diminution in size. In two cases the goitre actually increased in size while fairly large doses of thymus were being given, and in another it increased after first diminishing.

Of the contrast-cases, the goitre more or less diminished in four, and in a fifth the enlargement entirely disappeared. An increase in size was noted in only one case. In thirteen no change was observed.

It therefore appears that the progress of the enlargement of the thyroid has been much the same whether thymus was given or not.

The exophthalmos decidedly diminished in only one case, and in that it had commenced to lessen before the thymus treatment was started. In the contrast-series three lost their exophthalmos.

As regards the general bodily condition, in eight of the cases the weight was not recorded. In three there was no change. In four there was loss of weight. In three of these this amounted to only a few pounds; but in one of the three, the fatal case, there was considerable further loss of weight after the remedy was discontinued. In the fourth case the patient lost fourteen pounds in weight, but the loss was quickly made up for when the medicine was stopped. In a fifth case the patient lost weight to the amount of eleven pounds during the first two months of the treatment, but gained twenty pounds during the next two months. In four cases there was a marked gain in weight of from four to fifteen pounds. Of the comparison-series, I find loss of weight noted in only one and a marked gain noted in three cases, amounting to sixteen pounds in one case and thirty-five pounds in another. This, again, is somewhat in favor of the series treated without thymus, but I do not look upon the difference as at all significant.

The dose of thymus given varied from several ounces to ten or fifteen grains a day. The cases which had large doses did not appear to do any better than those treated with small doses.

At the same time it is quite evident, from the record of several of the cases, that the patients themselves were satisfied that the remedy benefited them. When it was discontinued they asked to be put back on it. In no case did it produce any unfavorable symptoms.

The combination of thymus and thyroid was employed in four cases—XXXII., XXXIII., XXXIV., and XXXV.—and in two of these it did not appear to be very well borne.

The last case, which was the fatal one, had no treatment for some weeks preceding her last illness.

The size of the thyroid enlargement appeared to make no difference on the progress of the case. About the same proportion of the cases, with little or no enlargement, did well as of those where there was a large goitre.

It will be observed that I prescribed other remedies along with the thymus in several of the cases, such as belladonna, bromide of potassium, sodium phosphate, etc. This would diminish the value of my observations, if I were endeavoring to maintain that the thymus gland had any specific value; but, as my thesis is that it has no specific influence, the administration of other remedies is not of material importance.

An important point which should be borne in mind is that the most remarkable of the cases of recorded benefit have been those in which the lamb's thymus has been employed. Möbius and Taty and Guérin, who failed to observe benefit, expressly mention that they employed the calf's thymus. I am not able to give exact particulars as to which form has been employed in all of my cases. The tabloids used were supplied by Messrs. Burroughs, Wellcome & Co., who informed me they were made from the thymus of very young calves. The extract of thymus was prepared for me by Mr. White, the pharmacist to St. Thomas's Hospital. It was prepared from lamb's thymus whenever it was procurable, and at other times from calf's. The calf's thymus was used in Cases XV. and XVII., in which large doses were used.

It seems unlikely that any important therapeutic effect should exist in the lamb's thymus and not in the calf's; the reported success of cases treated with tabloids of calf's thymus may be set against the failures.

The conclusion at which I have arrived is that the thymus gland possesses no specific action in Graves's disease. I have found it in most cases to have no effect either on the heart, on the goitre, or on the exophthalmos. At the same time it appears to be a remedy of some value, improving the general condition, and, in this way, may assist toward the recovery of the patient. I should, at present, place it in the same class of remedies as cod-liver oil.

I am of opinion that the dose, to be of any use, should be at least one or two drachms a day, of the fresh gland or its equivalent, in the form of extract or powder.

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## TYPICAL EXCISION VERSUS INVERSION OF THE VERMIFORM APPENDIX.

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THE not infrequent occurrence of gangrenous inflammation of the appendix vermiformis, and the fact that, in a certain proportion of cases, the gangrene extends to the cæcal wall, make it very desirable to get rid of the entire appendix, whenever possible, in operative attacks upon the organ. Any method which leaves behind appendical tissue thus becomes the seat of inflammation, whether this be an inversion of the stump of the organ after amputation of its distal two-thirds (Dawbarn),<sup>1</sup> or inversion of the entire appendix (Edebohls), is faulty in technique exactly in proportion to the amount of appendical tissue thus allowed to remain. The last-named procedure is particularly unphilosophical. Its originator announces that he does not know what becomes of the inverted appendix, nor does he care.<sup>2</sup> I have ceased to trust an organ with such an especially strong predisposition to destructive inflammation as the one in question, tucked away in the intestinal canal with

<sup>1</sup> *Medical Record*, 1895, vol. xlviii. p. 291.

<sup>2</sup> *THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, 1895, vol. cix. p. 650.

so complete an interference with its circulatory apparatus as to lead with almost positive certainty to subsequent and perhaps spreading gangrene of tissues. Its blood-supply is almost absolutely cut off by its severance from the meso-appendix, a condition which is found to obtain in cases of partial or complete gangrene of the organ in certain cases of appendicitis. In the latter an endarteritis obliterans of the branches of the appendicular artery, which pass from the margin of the meso-appendix across the latter structure to supply the appendix, is invariably found when sought for (Van Cott). Finally, strictures of the lumen of the organ, either congenital or acquired, are sometimes present and form an insuperable bar to the carrying out of the method. Further, in Edebohls's method there is absolutely no barrier to the spread of infection from the rotting appendix within the cavity of the bowel to the portion of the cæcal wall to which it still remains attached, from which point it is but a step further to the production of general septic peritonitis.

Under circumstances of opening the abdomen for prolonged operative procedures in cases in which it is very desirable to save every minute of time possible, there is great temptation to adopt a method which is certainly seductive in that it offers a most rapid as well as ready means of disposing of the appendix, with the end in view of preventing this organ from giving rise to troublesome disturbances in the future. It was with this object that I was recently induced to adopt the plan so highly recommended by Dr. Edebohls. The unfortunate termination of the case and the findings upon autopsy have completely convinced me that this is a most dangerous plan, and the error committed in following the recommendation of its originator would be but little short of a crime were I not to utilize the experience for the benefit of others who, like myself, attracted by the simplicity of the method and the ease and rapidity with which it may be carried out, may be induced to make trial of it.

The case was that of a patient who was referred to my service at the Brooklyn Hospital for operation for a right-sided pyosalpinx by Dr. Francis H. Stuart. The tube was found only moderately involved, and was easily isolated and removed. The left ovary was found to be about three times its normal size and studded with cysts of varying size; a double oöphorectomy and salpingectomy were therefore done. The appendix vermiformis was located in the S.E. position (downward and inward), and was freely movable in the abdominal cavity. As the element of time was important in this case, its inversion after the method of Edebohls was resorted to and accomplished with extreme ease. The patient rallied from the operation completely, and all went well with her for forty-eight hours, when indubitable symptoms of septic peritonitis developed, of which she died between the third and fourth days. The autopsy, conducted by Prof. Van Cott, the pathologist to the hospital, revealed a septic peritonitis having its starting-point at

the cæcum, which was gangrenous at the site of the inverted appendix. This portion of the large intestine was removed and its interior examined. The appendix, hauging freely in the cavity of the bowel, was gangrenous in almost its entirety, and several gangrenous patches, some of which were as large as a silver five-cent piece, existed upon the cæcal wall.

The device of Dr. Dawbarn, that of inverting the stump of an amputated appendix after throwing a loose purse-string suture about its base, is ingenious and easily executed in a certain proportion of cases. The open end of the organ gives access to the interior and affords opportunity for attempts at dilatation should stricture be present. That attempts to invert the organ do not always prove successful, however, I have learned from experience.

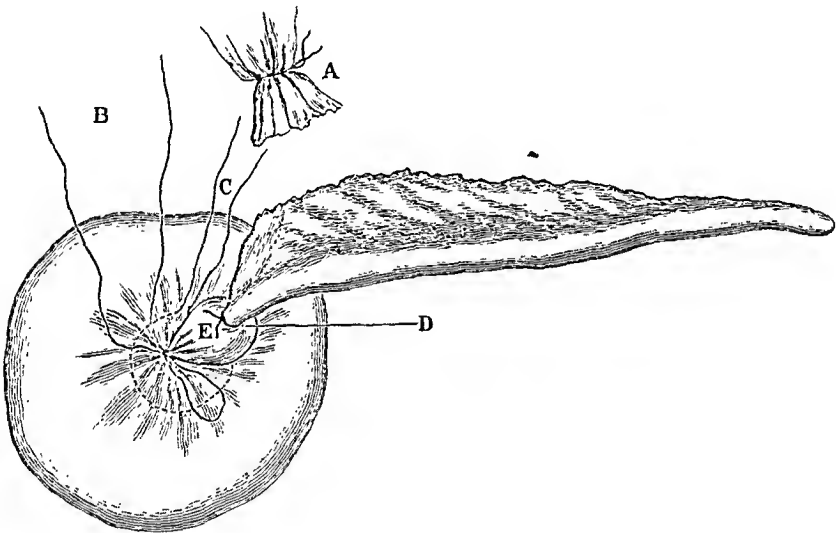
In the case of a young female from whom I removed the appendix at St. Mary's Hospital, Dawbarn's method of disposing of the stump was attempted. There seemed to be no difficulty in accomplishing the inversion. There was observed to be a communication between the lumen of the appendix and the cavity of the cæcum, as announced by the free escape of gas when the amputation was made. The patient died on the tenth day following the operation from a pulmonary condition entirely unconnected with the operation. The parts were examined after death by my assistant, Dr. Walter C. Wood, and found to be absolutely perfect so far as external appearances went. It was only after prolonged search that even at this early stage the site of the appendicectomy could be identified with the cæcum *in situ*. This portion of the large intestine was removed and a further examination made. A longitudinal section of the bowel revealed the highly interesting fact that the inversion had taken place outside the cavity of the cæcum. The appendix was turned inside out, to be sure, but this had taken place between the mucous membrane and the muscular and serous coats of the bowel. The former had been pushed toward the lumen of the bowel, the submucosa being put upon the stretch to permit of this, and the inverted stump lay in the space thus formed.

In the second case in my service at the Methodist Episcopal Hospital a stricture at the appendiculo-cæcal orifice balked every effort to accomplish the inversion, although the stump could be made to disappear completely from sight. Even palpation with the thumb and finger does not always give positive information upon this point, I am assured. It is only fair to say that I had employed Dr. Dawbarn's method a number of times before, and had quite adopted it as a routine measure in suitable cases, before the discovery of this possible fault in its technique.

The possibility of the existence of a sufficiently large vessel in the wall of the appendix from which hemorrhage might take place suggested itself to me early in my use of Dawbarn's method, and this was verified by an experience later on in a case at the Methodist Episcopal Hospital, as follows :

A patient was admitted with well-marked symptoms of appendicitis. It was found upon opening the abdomen that the wall of the organ at its base was comparatively healthy, and that inversion of the stump after amputation could be apparently accomplished with ease. Upon the following day the patient passed about four ounces of dark fluid-blood, following a movement of the bowels, as well as several large clots. This was repeated upon three different occasions in the course of the day, and told markedly upon the patient's general condition. It finally yielded to the administration of full doses of opium. A careful examination of the lower bowel failed to identify this as the source of the hemorrhage, and it is only fair to assume that it had its origin in the inverted portion of the appendix.

Upon the basis of these experiences I have made further efforts to develop an ideal method of disposing of the appendix in a manner that shall combine safety with, as far as possible, the expeditiousness of the unphilosophical method of Dr. Edebohl's and the brilliant device of Dr. Dawbarn.



A. Stump of meso-appendix. B. Temporary ligature upon caecal wall. C. Purse-string suture. D. Permanent ligature at base of appendix. E. Bulging portion of caecal wall where section is made with the thermo-cautery.

Starting out with the proposition that total excision of the appendix should be carried out whenever practicable, and that this should include, in addition to the removal of every possible portion of the organ, measures to prevent infection of the surroundings from contact with the contents of the interior of the caecum and the lumen of the appendix itself, as well as provision against hemorrhage from the point of section and accurate closure of the opening in the wall of the caecum, I have

perfected the following method. The appendix is exposed in the usual manner. The further steps of the procedure are as follows :

1. A ligature is passed through the meso-appendix and tied tightly about the base of the mesentery. The latter is then cut across and the appendix freed.

2. The appendix is grasped and drawn forward so as to put it upon the stretch. In doing this the cæcal wall surrounding its base bulges forward. A purse-string suture of silk is passed in the cæcal wall, after the manner of Dr. Dawbarn. This suture is placed upon the cæcal wall from a quarter to three-eighths of an inch from the extreme circumference of the base of the diverticulum or bulging portion of the cæcal wall, in order to insure that no portion of the appendix shall escape the subsequent excision. When the purse-string suture is completed its two free ends are given in charge of an assistant.

3. A temporary ligature is now thrown about the base of the portion which thus bulges forward and either twisted or tied in a "soft knot" (i. e., the second half or bow-portion of an ordinary single bow-knot, the first half of the same being omitted). If twisted, the ligature is prevented from untwisting by being grasped with forceps.

4. A permanent ligature is made to encircle the appendix about a half-inch away from the temporary ligature just described.

5. The appendix is amputated between the ligatures and close to the cæcal wall by means of the thermo-cautery, and the stump, which is really a portion of the bulging cæcal wall, touched with the cautery to arrest any possible hemorrhage. The use of the thermo-cautery also serves to sterilize thoroughly any portion of the contents of the cæcum or appendix which may be included between the two ligatures.

6. The purse-string suture is tightened, thus drawing in close apposition the serous surfaces about the cut edges of the cæcal wall, and effectually closing the opening which represents the site from which the appendix has been excised. The provisional ligature is removed by pulling upon one of its ends, the "soft knot" untying and coming away easily, or untwisted, if this method has been employed in securing it.

The entire procedure, as described, occupies but a few moments, and in point of safety possesses advantages that cannot be claimed for either of the methods which it is designed to replace.

When I recall instances in which I have spent considerable time in fruitless efforts to invert the stump of the appendix by Dawbarn's method in cases in which the thick and stiffened wall of the organ, or the existence of narrowing at the appendiculo-cæcal orifice, or both, made difficult ready inversion, and, not infrequently, prevented it altogether, I am convinced that the average time required in carrying out total excision is but slightly, if at all, longer than that of amputation and inversion of the stump.

Where the thermo-cautery is not at hand the excision may be made with the scissors, after careful isolation of the parts, and the exposed mucous membrane cleansed and disinfected by other means. While the risks of hemorrhage from the cut surface in total excision are not great when the section is made with the scissors or knife, yet the possibility of such an occurrence should not be lost sight of. The removal of, or omission of, the temporary ligature altogether would reveal the presence of bleeding; yet, as this would risk contamination of the surroundings following the escape of fecal matter from the *cæcum*, I have deemed it best to insist, whenever possible, that the section be made with the thermo-cautery, and that the ligature be permitted to remain *in situ* until the purse-string suture is tightened.

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## HYSTERICAL MONOCULAR AMBLYOPIA COEXISTING WITH NORMAL BINOCULAR VISION.

WITH REPORTS OF TWO CASES.

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UNTIL recent years it was assumed that the *anæsthesiæ* of hysteria differed in their outward manifestations in no way from the *anæsthesiæ* due to organic disease. It is now well known that there is a great difference in the behavior of these defects, according as to whether they are of organic or of functional origin. For instance, among the essential peculiarities of hysterical cutaneous *anæsthesia* may be mentioned the tendency to variability in its distribution, its boundaries enlarging and contracting, sometimes from day to day, and its intensity deepening and lightening. The possibility of transfer from one side of the body to the other in exceptional subjects is also noteworthy. The variations in the extent of the visual field is a phenomenon analogous to what occurs in the areas of common sensation.

More remarkable is the fact, which has been shown to be true of at least one class of hysterics (whether it is true of all remains to be proved), that in one sense of the word this *anæsthesia* is no *anæsthesia* at all. The hysteric really feels and hears and sees. The sensory impulses coming from the periphery are not only physiologically recorded, but are perceived by the subject and associated with other mental processes. The real defect is a psychical one—namely, the sensory images do not enter into that chain of associated ideas which constitutes the individual's personality. This fact has been confirmed by numerous observers.



Some time since I had an opportunity to demonstrate this sensory peculiarity in a patient of mine. The results obtained were in entire harmony with those recorded by Binet, Janet, and others, in France. A knowledge of their peculiarities renders more intelligible, perhaps, though they may continue difficult of complete explanation, some of the still more recent observations on the behavior of hysterical amblyopia. These observations are illustrated by the cases I am about to report, which thus may be taken as further confirmation of what has been previously observed.

It has been assumed hitherto that the tests for organic amblyopia are applicable to hysterical amblyopia. This would seem in the light of these recent experiments not to be the case, and a persistence in their use is liable to lead to grave error.

The first of the cases which were the objects of the following observations was one of hysteria in a male presenting the usual phenomena of hemianæsthesia and hemiplegia. In the grouping of the symptoms, which were classical, it was a typical case. One point worth remarking, however, was the purely psychical character of the cause, which was a mental shock or fright of what would seem to be moderate severity:

The patient was sitting in an electric street-car which was in imminent peril of colliding with the car ahead of it. The impetus of the car was so far stopped that the collision was trivial. That, however, danger was apprehended was shown by the fact that one passenger, seeing the probability of collision, jumped off the car to avoid the shock. The patient was thrown forward partially out of his seat, so that he struck the side of the car. I should judge that this was due to the sudden checking of the impetus of the car by the brakes rather than to the collision.

I am indebted to Dr. F. G. West for the opportunity to examine the case. Dr. Edward Lane, superintendent of the Boston Lunatic Hospital, was also present at and took part in the examination. The examination, eighteen months after the accident, revealed besides the visual symptoms the following conditions: left hemiplegia (face not involved). The grasp of the left hand very feeble when eyes are open and fixed on the movements of the hand; when eyes are closed grasp of hand becomes almost *nil*. Rises from bed with great difficulty; can walk with help. Tongue protruded straight. Left hemianæsthesia and hemianalgesia, involving face. No atrophy. Paralyzed limbs not spastic. No ankle-clonus. Knee-jerks equal and normal. Hearing: right ear hears watch at six inches; left, in contact. Principal subjective symptom was pain in back of the head and down spine, which was tender. Patient very emotional; cries without sufficient cause; irritable, and during examination became violently excitable; seemed to think he was the object of a conspiracy. (It was said that a few days subsequently he had left the house and hid himself in the marshes.) At the time of the accident it is stated by him that there was a momentary loss of consciousness, followed, on coming to himself, by momentary blindness (?). Taken home and put to bed. Symptoms at this time: dull, heavy

burning pain in the back of the head, and pain in the spine; nausea without vomiting. Confined to bed for fourteen months by pain, paresis, etc.; then gradually improved. Now able to be up about four hours a day. Whole mentality has changed; formerly a person of good spirits and temper; now depressed, and as above. That the symptoms were due to hysteria is confirmed by the subsequent history.

The points to which I wish to call attention here were the peculiar characteristics of the amblyopia. The left eye was affected—that of the paralyzed side.

The vision in the right eye was good. I will say here it was not thought desirable to repeat the examination to determine the exact visual acuteness in each eye, owing to the highly excitable and other mental symptoms exhibited by the patient and the exhaustion caused by the examination. I should also have made other tests of scientific value were it not that I did not consider it desirable for the same reasons. I hoped to be able to do so later, but in this I have been disappointed. But it was easily determined that the vision in the left eye was much impaired, and presented the following apparent anomalies:

When fingers were held up before the eye (the right eye being closed) at a distance of say one foot to three feet, he (the patient) could not count them though they were seen in an indistinct way; but when moved away from him to a distance of about eight feet, he could count them, or rather he saw them multiplied; *i. e.*, there was *monocular polyopia*.<sup>1</sup> A candle at this same distance was seen; but not as a distinct flame, but as splashes of light. Ordinary type of a newspaper or book could not be read with the amblyopic eye at any distance. The left eye was also color-blind.

The field of vision of the left eye was retracted to the extent that at the distance of eight feet it had a diameter of from two to three feet.

There was, then, in this case *monocular amblyopia, color-blindness, retraction of the field of vision, polyopia, and a withdrawal of the fixation-point; or, rather, a retraction of the near-point and an approach of the far-point to a distance of about eight feet.*<sup>2</sup>

To test the genuineness of these phenomena I gave the patient a book to read, and while he was reading aloud I slipped a pencil between the sound eye and the printed page.<sup>3</sup> To my surprise he read the words

<sup>1</sup> An oculist who saw the patient stated that the largest A of Snellen's test-types was not read when held close to the eye, but was read at a distance of eight feet.

<sup>2</sup> There were two peculiarities in connection with the polyopia and withdrawal of the point for clearest vision worth noting. The multiplication of the objects was not always a fixed number, as would presumably be the case in monocular polyopia from physical defects of the visual apparatus (lens). That is, he did not constantly see three, four, or five objects, but stated that he saw a great many and found difficulty in counting them. A physical defect ought always to produce a definite multiplication. Unfortunately this point was not very accurately inquired into, but the patient's statement accepted. (The patient was very irritable and excitable, and the examination was conducted with difficulty.) Secondly, the fact that large A, Snellen, could be read at eight feet, but not at say one foot, cannot be explained on principles of optics. To read this at eight feet requires an accommodation of only one-half dioptric; that is, parallel rays must be converged by a lens of that amount; this type should be read at one foot. The explanation of these two phenomena must therefore be psychical and not physical.

<sup>3</sup> The principle of this test is as follows: in binocular vision, both eyes being normal, a pencil or a similar object held in the line of vision of one eye before a printed page does not obscure any part of the field because the letters obscured from one eye are seen by the other; but if one eye be blind, the pencil interposed in the line of vision of the sound eye must

without interruption. If hysterical blindness follows the same laws as organic blindness, this test would indicate malingering. If he could not see with his alleged amblyopic eye, any sufficiently large object placed before the good eye must necessarily obscure some of the printed words.

Before forming a decisive opinion, it was thought advisable by Dr. Lane, Dr. West, and myself to make further tests. I therefore procured a very strongly convex lens, through which it was impossible for an ordinary eye to discern objects. Giving the patient again a book to read, I slipped the lens in front of the good eye while he was reading. If the alleged blind eye was really blind, he should not be able to read under these conditions; but if this eye was not blind, and supposing he was unprepared for the test, as I have every reason to believe he was, he should have read without difficulty. As a matter of fact, he stopped reading at once, and found fault with me for preventing his seeing.

The following test was then resorted to: a lighted candle was held about eight feet from the patient. At this distance the amblyopic eye alone could not recognize the candle-flame as a distinct flame, but saw it only as splashes of light. The other eye saw the flame distinctly. Now while both eyes were open a prism was held over the amblyopic eye. The principle of this test, it will be remembered, is this: if the person has normal vision in both eyes and a prism is held before one of them, any object is seen double—diplopia; but if one eye is blind, only a single object is seen when the prism is held before the good eye.

Now when the prism was held before one of the eyes of this patient both eyes being open, not only were two candles seen, but they were seen as two distinct flames described by the patient as similar to one another. In other words, the patient saw normally with each eye when both eyes were open; but the convex-lens test apparently showed that he did not see with the left eye when the good (right) eye was closed or obscured.

What conclusions are we to draw from these apparently anomalous phenomena? Are we to conclude that this patient was shamming, or that hysterical amblyopia follows different laws from that due to organic disease? Before passing upon this question, I should like to call attention to the work which has been done in the elucidation of this subject, the reports of which are, so far as I know, confined to French works.

Parinaud was the first to point out some of the remarkable peculiarities of hysterical amblyopia, which I shall later refer to, but it will be more convenient to speak first of the work of Pitres.

Pitres's first experiment was made upon an "hysteric who," he writes, "for several years had been scarcely able to distinguish light from darkness with the left eye. The test employed was that of the 'boite de Flees,' designed to detect malingerers. This apparatus, you perhaps

necessarily cover certain letters which consequently cannot be read, as the second eye is blind. The test is useful to detect malingering, but requires care in its use. A malingerer, falsely claiming to be blind in one eye and not knowing the test, reads all letters without hesitation, thinking he does so with his good eye alone.

know, is formed by a box furnished with two oculars and having the external appearance of a stereoscope. At the bottom of this box are placed two points of different colors, one at the right and the other at the left, and by an ingenious arrangement or disposition the subject sees with his right eye the point situated on the left, and *vice versa*. Suppose that a malingerer who has not been warned pretends to see with the right eye; he will say that he does not see the point that appears to him on the right; now it is precisely that point which is perceived by the left eye. But to come back to our hysteric. Hardly had she looked into the instrument than she said without hesitating: 'I see two points, one red and the other blue.' I showed no surprise. However, I observed that the deceit I suspected did not betray itself by the mistake which malingerers usually commit. Some time after that I repeated the experiment of the 'boite de Fless' upon two other hysterics, equally amblyopic on the left side. The results were the same. These patients, who did not see with the left eye alone, distinguished very clearly the two points at the bottom of the box. I asked myself then if the hysterical amaurosis was not a functional trouble existing only in monocular vision, and, proceeding upon this hypothesis, I made a certain number of experiments, of which the concurring results established my conviction.

"Here is one of the patients who served for these observations. When her left eye is closed she sees very well with the right eye. When, on the contrary, the right eye is closed, she scarcely distinguishes with the left eye light from darkness. The two eyes being open, I ask her to look at a red cross drawn in the centre of a black background. Then I place a prism before the right eye. The patient sees at once two red crosses. Place now the prism before the left eye, and the patient still declares that she sees two red crosses. According to well-known physical principles, this diplopia, induced by the interposition of the prism, can be produced only if the two retinæ are excitable. One of the two is excited, in fact, by the real image, while the other perceives the image deviated by refraction. Under the conditions in which we have just placed her our patient then used both eyes for vision.

"Let us now use the experiment with the screen. I write upon the blackboard a line of letters; a sheet of cardboard is placed vertically before the meridian-line of the face of the patient while she is seated immediately in front of the blackboard. When the right eye is closed she declares she is incapable of distinguishing the characters written upon the board. When the left eye is closed she reads with hesitation the letters written on the right screen. When both eyes are open she reads all the letters, those on the left of the screen as well as those which are on the right."

What has been shown by Pitres to be true of the perception of form has been shown by others to be true of the perception of colors. Parinaud, for example, found that if the left eye is blind for green, which it sees as gray, while the right eye is normal, and a prism is placed before the normal eye, instead of two images, one gray and the other green, being seen, both are green. He adds: "On repeating this experiment, I have observed that if the prism is placed over the abnormal eye, the two images are gray; but it is necessary for this that the ambly-

opia should not be too pronounced." This, if true, is a fact difficult to reconcile with the other phenomena. The same observer further found what may prove to be a fact of considerable practical value, that a certain number of patients who were color-blind in *both* eyes, each tested separately, could *distinguish colors in binocular vision*. Parinaud concluded as a result of his observations in hysterical amblyopia that an eye that does not see in monocular vision can see in binocular vision, although this is not true in all cases. He is disposed to attribute the failure to see to "too high a degree of amblyopia in the *second* eye, or that binocular vision did not exist or existed imperfectly before illness."

The observations of Parinaud have been confirmed by others. Charcot and Regnard made the following experiments :

A patient blind for green could see red ; but if a disk colored partly red and partly green revolved, she saw it not as red, but as gray ;<sup>1</sup> when the disk was still it was seen as red and white. Again, a red and white disk was placed by the side of the first ; the patient saw them alike ; but when the red and white disk was in motion the patient saw it as pale red, while the red and green disk in motion was seen as gray.

Regnard also demonstrated that an hysterical color-blind for red still has a green after-image ; and Charcot observed that certain persons with hemianæsthesia and monocular color-blindness for one color see distinctly that color even with the affected eye in binocular vision. Bernheim also has confirmed Parinaud's results.

It is also stated that the re-establishment of binocular vision in these cases is not true of peripheral vision, but only of central vision, although in many cases of concentric limitation of the visual field the field enlarges 10°-70° on opening the second eye. The explanation of these curious phenomena still remains to be found. Parinaud thought they showed that there is a special mechanism for binocular vision, that in monocular vision each eye is in connection with a single hemisphere, that of the opposite side ; in binocular vision, on the contrary, the two eyes are in connection with each hemisphere, which may be indifferently right or left.

Janet, while indorsing this view, would also add a psychological element of the nature of the associated sensations, for he claims that the amblyopic eye of certain subjects can see even in monocular vision, if the visual image occurs simultaneously with a strongly associated sensation of another kind, "just as the image of a caterpillar upon the arm restores the tactile sense of the [anæsthetic] arm. So the images from the sound eye may, by association, bring back into the field of consciousness the images from the amblyopic eye." That this, however, is not a complete explanation will become evident by the fact, as will

<sup>1</sup> Red and green mixed are normally seen as gray.

be observed in the second case here reported, that normal binocular vision may be present even when both eyes tested singly are amblyopic.

Before returning to the case just described, I will briefly refer to the other ocular symptom present, viz, relatively clear vision for objects at a fixed distance only and polyopia. Parinaud explains the former by a contracture of the muscles of accommodation. By reason of this contracture the near-point and the far-point coincide, and the eye cannot accommodate for objects placed either nearer or further than that determined by the contractures. Thus a concave lens may be necessary for distance and a convex lens for near objects.

Charcot has also insisted upon the occurrence of this form of contracture in hysteria following traumatism. Parinaud claims that this contracture is often overlooked, because it is generally concealed by the amblyopia. That this is not a satisfactory explanation of the phenomenon in question, in our case at least, has already been pointed out (see foot-note, page 159). It is more probable that this phenomenon is dependent upon cerebral or psychical disturbances, and has therefore a central origin. The same may be said for reasons already given of the polyopia which quite frequently accompanies hysterical amblyopia. This has been explained by the contracture. It appears only at a certain distance, which corresponds to that fixed by the supposed contracture. Even upon this supposition the exact connection between the two is not clear. It is assumed that it is due to unequal refraction of all the segments making up the lens, and in consequence of which the image from each segment is not focussed on the same spot on the retina. Parinaud assumes, without proof, as it seems to me, that this unequal refraction is caused by the contracture of the muscle of accommodation. A central origin seems to me more likely, at least when the polyopia is a multiplication of images of an inconstant number.

Since the above notes were presented to the Boston Medico-Psychological Society I have had the opportunity to observe another case of hysterical amblyopia, which presented the phenomena of improved or normal sight with binocular vision. As this case, however, was the subject of litigation, and as one of the most important points to be determined is the possibility of deception, which has been very strongly intimated in certain quarters, this case will add nothing to what has already been noted above. As I could not absolutely exclude deception, the accuracy of the observations might be questioned. In order that the question of deception might be settled, I have been for a long time in search of a case, the *bona-fide* character of which could be accepted without question. Such a case I now present. It seems to me that the conditions under which the case was observed must carry the same conviction to others as to myself, that malingering can with perfect

safety be excluded. It is desirable that the circumstances under which the case was observed should be related.

The subject was an applicant for a position on the police-force of the city of Boston. To obtain such a position every applicant is required to pass a physical examination under the Civil Service Commissioners of the State. The examinations under the civil service rules are competitive, and involve considerable trouble and some loss of time to the applicants, who frequently give much time to a preparatory training for them. Each applicant is obliged, first, to pass a competitive educational examination; he is then examined physically to determine his soundness, and finally is obliged to compete in a physical examination in gymnastics. Those receiving the highest percentages are recommended for appointments. All this, it will be seen, involves much time and trouble on the part of the applicant, and it is plainly for his interest to pass as good an examination as possible.

It is difficult to conceive of a mentally sound person attempting to pass such an examination and then wilfully and deceitfully pretending to have poor eyesight.

It may be added that the subject presented all the appearances of being honest, and in other respects no suspicion of malingering was attached to him.

On May 9, 1896, the applicant presented himself. When I examined his vision I covered his right eye as usual with a screen, and asked him to read Snellen's test-types with the left eye. He could only read  $\frac{1}{100}$ . As soon as he did this he turned to me and said that he could not see well with each eye separately, but he could see perfectly if he used both eyes together. He went on to say that two or three years ago he had been rejected on account of imperfect sight by the physician making the examination, who tested each eye separately, and therefore found, as I had, defective vision in each. The patient further stated that when he was informed of his rejection he was surprised, because he always thought he had good sight. He then went to an oculist, who confirmed him in the fact that with binocular vision his sight was normal; it was only with monocular vision that his eyesight was impaired. He argued that inasmuch as he had perfect binocular vision he should be passed. It was plainly evident that it was greatly to the advantage of this patient to make out his eyesight to be as near perfect as possible, while the contrary was to his disadvantage.

After he made this statement, I continued the examination and found that the vision of the right eye alone was  $\frac{1}{50}$  minus. Binocular vision was  $\frac{2}{10}$ , which, taking into consideration the poor light of the room, was better than normal. His visual field, tested with the finger, was apparently normal. I also made out partial color-blindness; according to my recollection, the color not recognized was green, but my notes are defective on this point and it is possible that this observation may have been erroneous (although I do not think so), inasmuch as on the second examination he matched all colors perfectly.

Later the applicant was subjected to three different examinations; on

one occasion in conjunction with Dr. J. J. Putnam and on another occasion by Dr. O. F. Wadsworth, who, as an oculist, kindly examined the case for me and has given me the results of his examination. I am thus fortunately able to add to my own observations those of two independent and competent observers—one of them an oculist. Results of the tests used at these examinations varied somewhat, but I may state here we all agreed *as to the bona-fide character of the phenomena, the existence of amblyopia when one eye was closed, and normal vision when both eyes were open.*

On May 10th, when the subject was examined by Dr. Putnam and myself, he still exhibited the same degree of amblyopia as on the previous day, when one eye was completely covered—that is:

$$V. O. S. = \frac{17}{100}.$$

$$V. O. D. = \frac{17}{100}.$$

When neither eye was covered, vision was  $\frac{20}{15}$ . Now, when the prism was slipped before either eye, contrary to what was expected and to the results obtained in my previous case, the *amblyopia developed at once, and diplopia was not exhibited.* Repeated tests with the prism gave the same results, which were the same irrespective of the direction of the axis of the prism; that is, whether vertical or horizontal, and irrespective of the position of the base, etc. So that it is not probable that the absence of diplopia was due to the patient involuntarily overcoming by muscular effort the effect of refraction. This seemed to show that in this case, although light entered both eyes, the amblyopia was not removed and binocular vision was not really restored. We thought this might be due to auto-suggestion, or some mental inhibition or disturbance of the visual images derived from the two eyes; this disturbance being caused simply by the presence of the glass, which suggested that the eye before which it was held was covered or its vision interfered with. To test this point, and not having a plain glass, a diaphragm was made from a piece of paper in which a hole was cut. Later an ophthalmoscope without a lens was substituted for this. The patient was made to hold the diaphragm before one eye, but to use both eyes for vision. Care was taken to make sure that the patient held the diaphragm with the hole directly in the line of vision. Under these conditions, of course, the binocular vision was not *physically* interfered with at all. Nevertheless, at first the amblyopia was not removed, the patient saying he was unable to see. Later, after the patient learned to use the diaphragm and began to appreciate that there was nothing in the apparatus that would interfere with his vision, he was able to see nearly normally; and at the next examination he reported that he had been practising with such a diaphragm at home and could now see perfectly well.

Dr. Wadsworth, also, reports that he made a similar test as follows: “Two prisms of equal magnitude were placed together so as to counteract one another and make what was equivalent to a plain glass, and then held before one eye. Under these circumstances the amblyopia still persisted, although theoretically, from an *optical point of view*, the patient should have seen as well as when he used both eyes without a glass. This experiment seemed to show that the failure to see under the conditions of the experiment was due to some sort of mental inhibition by auto-suggestion.”

On the next day the patient, being examined by myself alone, the



the examination to a degree out of all proportion to what would occur to a normal person, and that peculiar quivering of the eyelids so frequently observed in hysteria was very noticeable. There was no anaesthesia of the face or hands. The surface of the remainder of the body was not examined.<sup>1</sup> In all other respects the patient was a perfectly healthy individual, unconscious of any infirmity, who performed manual labor daily. I was unable to obtain any history that would throw any light on the origin of his trouble. No blue-line on his gums or other evidence of lead-poisoning. He had received a slight blow on his head a few years ago, but this at the time did not cause any noticeable disability.

It seems to me that this second case settles, if this still be necessary, the question once and for all of malingering as an explanation of the apparently paradoxical phenomena observed in hysterical amblyopia.

I may say that Dr. Putnam, Dr. Wadsworth, and myself were agreed that deception was not to be entertained in the second case just reported.

These cases may be taken as corroborative of what has been observed by such competent observers as Parinaud, Charcot, Pitres, and others on the Continent. The fact that the results obtained by each of these observers have been substantially in harmony is not to be overlooked.

The circumstances under which my first case was observed, it being one that was involved in litigation for damages, did not preclude the possibility of simulation; and the fact that the tests gave results similar to those obtained in simulated blindness from organic disease naturally suggested the theory of deception. But, on the other hand, the other phenomena observed in this case can hardly be reconciled with this theory. To maintain this view it is necessary to assume that the patient was conversant with the phenomena of monocular polyopia and the so-called contracture of the ciliary muscle(?) (a clear vision only for objects at a fixed distance), phenomena which, as yet, so far as I know, are not mentioned in English text-books in connection with hysterical amblyopia.

I am also certain that the physicians who had the case in charge, or who saw the case with me, were not familiar with these phenomena, and that therefore the subject could not unconsciously have obtained a hint from them. It should also be borne in mind that the other somatic symptoms observed in this case, such as paralysis, anaesthesia, etc., were typical of hysteria; and if the peculiar phenomena connected with the amblyopia had not been observed, one would never have thought of doubting the *bona-fide* character of the other symptoms.

The fact that hysterical amblyopia follows different laws from those of organic amblyopia is one of the highest practical importance. And it is necessary to bear this in mind in applying the ordinary tests for

<sup>1</sup> Further examination could not be obtained.

simulation. Tests which are applicable to organic amblyopia are useless in the hysterical form, but valuable in distinguishing organic disease from functional disease, but not in determining the actual existence of the latter.

The occurrence of binocular vision in monocular blindness in hysterics, even when there is some impairment of vision in the sound eye, explains the slight disability occasioned to such patients by this ocular defect.

## RELATION OF DERMATITIS HERPETIFORMIS TO ERYTHEMA MULTIFORME AND TO PEMPHIGUS.<sup>1</sup>

BY LOUIS A. DUHRING, M.D.,

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CONSIDERING that there has been, and that there still exists, some diversity of opinion among dermatologists regarding dermatitis herpetiformis, especially as to the cutaneous manifestations which should be included under this caption, and those that should be relegated elsewhere, a few remarks concerning the relation of this dermatosis to several well-known diseases may be made, with a view of making the subject plainer. It is not my intention to discuss the literature of the past decade, to criticise the cases that have been recorded as examples of dermatitis herpetiformis, nor to discuss the views of the reporters of such cases, beyond remarking that in some instances gross injustice has been done to this disease. It is not out of place to state here that the writer, in the light of additional clinical experience, sees no reason for changing his views as expressed in his earlier communications. Well-defined, typical cases are from time to time still presenting themselves to him as formerly. Cases with less clearly defined features are also sometimes met with, as well as occasionally cases in which it is difficult in the beginning of the attack to decide whether they should be classified with dermatitis herpetiformis or with some other disease. Such being the case, it is proper to note and label all the typical cases met with. There are enough of these to make the subject interesting and to enable us to say that they represent a special cutaneous disease—a disease *sui generis*. There exists among observers, however, but little difference of opinion concerning typical cases. These have been recognized and described in all dermatological centres, and the reports are so uniformly alike that no time need be spent here in a recapitulation of this subject.

The two diseases that bear the most likeness to dermatitis herpeti-

<sup>1</sup> Read before the American Dermatological Association, September 11, 1896.

formis are erythema multiforme and pemphigus. Dermatitis herpetiformis possesses clinical features common to both, but it is more closely related to erythema multiforme than to pemphigus. It also possesses features in common with herpes, in a sense that the eruption is herpetiform and also neuritic. By the term neuritic I mean that the cutaneous manifestation is obviously under the control of the nerves of the skin, as in the case of herpes simplex and herpes zoster. With the term neurotic, on the other hand, I would convey the idea that the disease of the skin was due to nerve-influence, but that this cause was not necessarily patent on the skin. Thus, alopecia arcata and vitiligo are both neurotic diseases, but they do not display unmistakable signs of the cutaneous nerves being involved, and hence would not be called neuritic. Upon the herpetiform character of dermatitis herpetiformis I have always insisted. This feature is striking in all cases, and is a just reason for taking exception to the term dermatitis multiformis for this disease, as has been suggested by some observers. The term multiformis fails to convey any idea of the chief characteristic of the disease, namely, its herpetiformity. The term multiformis is general and vague, and is without special significance beyond the point that it indicates polymorphism, a feature common to certain other diseases, notably eczema. Herpetiformity, on the other hand, as stated, is eminently characteristic of this disease. Without it there can exist no dermatitis herpetiformis.

I have stated that dermatitis herpetiformis possesses features in common with erythema multiforme. Not only are both diseases strikingly polymorphic in their manifestations, but they are, moreover, allied in nature. In some cases of dermatitis herpetiformis this observation is conspicuously manifest. Many cases will be found at one period or another in their course to possess certain features common to erythema multiforme. There are instances, however, in which no resemblance to erythema multiforme occurs at any period in the course of the disease. It will be understood that erythema multiforme is employed in its broadest sense, and that it includes herpes iris. In dermatitis herpetiformis the cutaneous manifestations, it may be remarked, are in most cases more intense, more persistent, and more chronic than in erythema multiforme. The formation of pustules, especially miliary and acuminate, moreover, so common in dermatitis herpetiformis, is a feature that is wanting in erythema multiforme. In some cases the series of symptoms in dermatitis herpetiformis are such as to suggest the idea of a chronic erythema multiforme. But, even in these instances, the process will be found to be considerably more than a chronic erythema multiforme, so that even if the use of this term were sanctioned, a correct idea of the process of dermatitis herpetiformis would not be conveyed. While, therefore, some cases of dermatitis herpetiformis are allied to erythema multiforme, and simulate that disease, it would be unjust to both to regard

them as being one and the same disease. It may be remarked here that, in my experience, dermatitis herpetiformis simulates erythema multiforme more frequently than *vice versa*. I have seen cases of undoubted dermatitis herpetiformis (as proved by the history and the subsequent course of the disease) resemble in the beginning erythema multiforme, but usually only for a short period. I have also met with rare cases in which a threatened dermatitis herpetiformis proved to be an erythema multiforme. Such experience long ago led me to the conclusion that these diseases were cognate.

The other well-known disease to which dermatitis herpetiformis bullosa is more distantly related, and to which it bears a likeness, is pemphigus, but from which it differs in important particulars. In dermatitis herpetiformis blebs occur in certain varieties. They appear especially in the bullous and in the multiform varieties. In pemphigus, it need not be said, they are constant lesions. The existence of blebs in dermatitis herpetiformis does not in itself signify a relationship to pemphigus any more than the blebs in herpes iris indicate a kinship to pemphigus. No one, I believe, at the present date holds the view that herpes iris and pemphigus are closely related; nor does anyone contend that pemphigus and herpes simplex or herpes zoster are akin. In this connection I may refer to the subject of the coexistence and the combination of morbid processes, giving rise to deviations in type and to modifications, which I believe is a much commoner occurrence than is generally considered to be the case. By admitting that morbid processes in general may coexist or combine, the numerous variations from types of diseases so constantly met with may be accounted for. Some so-called "anomalous cases" may thus be explained. The point of practical importance in all such instances is to determine the prevailing morbid process, to distinguish between essentials and accidentals, in order that therapeutics may be directed against the predominant process. I believe that dermatitis herpetiformis may in rare instances occur in combination with certain other diseases, particularly with erythema multiforme and with pemphigus; and also that it may merge or lapse into these diseases. Clinical experience seems to warrant this statement, and I can see no objection to accepting this belief. Cases of dermatitis herpetiformis sometimes occur that partake more or less distinctly of erythema multiforme, others of pemphigus; that is to say, they possess clinical features that are strongly suggestive of one or the other of these diseases, yet holding fast to the peculiar features of the type. It may be said that dermatitis herpetiformis occupies a position between erythema multiforme and pemphigus.

It will be borne in mind that dermatitis herpetiformis possesses the peculiarity of manifesting itself with varied primary lesions, and of pursuing an irregular course. Irregularity or even capriciousness in

the production of the lesions is in most cases a notable feature. They may be erythematous, papular, vesicular, pustular, bullous, or a mixture, and sometimes they all occur together. Polymorphism is usually a prominent feature, geuerally more so even than in eczema. On account of this peculiarity a general likeness to eczema is occasionally met with. I recall one of my earlier cases, that was under observation for a long period, the lesions being small herpetiform vesicles and pustules, occurring in patches, accompanied by intense itching, and was for a long time regarded as a multiform eczema of an unusual type. Throughout a period of several years it certainly bore more resemblance to eczema than to any other established disease of the skin. At no time was there any likeness to erythema multiforme (erythematous, vesicular, or bullous), nor to pemphigus. In dermatitis herpetiformis polymorphism is even more notable than in erythema multiforme. It is not, however, a constant feature. Occasionally cases are met with in which it does not occur, the lesions being, it may be, vesicular, pustular, or bullous throughout the attack. It is especially in relapses and recurrences that this feature is most conspicuous. In this respect the disease is altogether different from pemphigus. The evolution of the lesions, moreover, is irregular, and is peculiar. In probably no other disease is this so singular. One notable feature is that they incline to make abrupt and radical changes, as, for example, a vesicle into a pustule or bleb; and, furthermore, that vesicle, pustule, and blebs at times may appear simultaneously, and often are seated side by side. The lesions also tend markedly to vary in kind in relapses and in recurrences. This is a striking point in the course of the disease. I have referred to these characteristics because they are totally different from those which mark the symptomatology of pemphigus. One cannot conceive of a pemphigus without blebs, perfect or imperfect in formation. There are but few of the exudative diseases that are more uniform in the production of their cutaneous lesions and that are more regular in their evolution than pemphigus. The evolution of the lesions of a disease, I contend, plays an important part in the history of that disease. It constitutes an integral part of the malady, and one that must not be lost sight of. It is this characteristic that I desire to lay stress upon in differentiating dermatitis herpetiformis from pemphigus. I believe that, if in a case of bullous dermatitis herpetiformis the course of the disease be watched for a long period, polymorphism of lesions will in most every instance sooner or later manifest itself to such a degree that pemphigus must be excluded in the diagnosis. But even in cases in which the evolution of the lesions is ignored there exists in dermatitis herpetiformis more or less conspicuous herpetiform features that are wanting in pemphigus vulgaris. If, therefore, the herpetiform features, the evolution of the lesions, and the course of the disease in dermatitis herpetiformis

be kept in mind, the question of pemphigus will seldom arise in diagnosis. It is altogether unreasonable and irrational to hold, as some observers have done, that dermatitis herpetiformis bullosa is merely a pemphigus. If such observers will closely observe and follow the process of the evolution to its termination, and, further, if they would note the relapses and recurrences which so commonly take place, they would not be so likely to confound these diseases.

CONCLUSIONS. The conclusions I would arrive at, briefly expressed, are :

1. That dermatitis herpetiformis is in most instances a disease with well-defined, tolerably constant clinical features which enable it to be distinguished from other cutaneous diseases.

2. That it is in most instances more closely allied to erythema multiforme than to any other generally recognized disease.

3. That one variety, the bullous, possesses features which resemble those of pemphigus vulgaris, from which disease, however, it differs in the peculiar inflammatory and herpetiform character of the cutaneous lesions, as well as in the tendency to polymorphism, the irregular evolution of the lesions, and in its course.

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## A CASE OF THORACIC ANEURISM.<sup>1</sup>

BY JOHN B. SHOBER, M D.,

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LIZZIE B., colored, aged thirty-five years, married, no children, was admitted to the Howard Hospital September 4, 1894, on account of a painful swelling of the left sterno-clavicular articulation. Her family history was negative, but she gave a clear history of syphilis, contracted when she was eighteen years old, and for which she was under treatment for over a year. Since then she enjoyed fairly good health until about three months previous to her admission. During this time she suffered with severe headaches and increasing dull, boring, and neuralgic pain above the left clavicle and down the left arm and at the left sterno-clavicular articulation. Here a swelling made its appearance. These symptoms became so aggravated during the week previous to her admission that she was unable to sleep, and on account of dyspnoea she could not lie down. She was of medium height, poorly nourished, and decidedly debilitated. The swelling was about the size of an English walnut, situated a little below and over the left sterno-clavicular articulation. It was painful on slight pressure and gave the impression of containing fluid, especially on the upper surface. No pulsation was at this time perceptible. Its base was hard and indurated. The overlying skin was unaltered in appearance. The positive history of syphilis,

<sup>1</sup> Read before the College of Physicians of Philadelphia, May 6, 1896.

together with the rapid growth, the pain and indistinct fluctuation, and the situation of the swelling, suggested gunma, and she was therefore admitted to the surgical ward. Upon the following day, however, while prepared to incise, curette, and pack in the usual way, and while speaking of the importance of making a positive differential diagnosis between aneurism and other growths in this situation, I was startled by detecting a faint impulse on the apex of the swelling, synchronous with the pulsation of the heart. There was no bruit, murmur, or thud, and, beyond the faint impulse, no sign of aneurism. Examination of the heart showed no evidence of valvular disease. The radial pulses were full, regular, and even, and not atheromatous. Enough counter-indication to incision had been found, and the patient was treated expectantly for some days. Absolute rest in bed was enjoined, with medium diet and gentle purgation. While the tumor gradually increased in size the patient's general condition seemed to improve. Her headaches and local pain became less severe, and she expressed herself as feeling well enough to go home. On September 15th, eleven days after her admission to the hospital, a plaster cast was made (Fig. 1), and the following notes of her condition were taken :

FIG. 1.



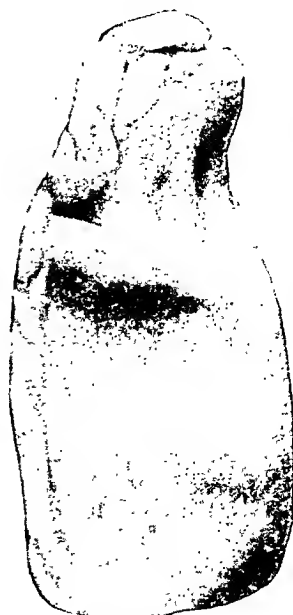
September 15, 1894.

FIG. 2.



September 30, 1894.

FIG. 3.



October 30, 1894.

Plaster-of-Paris casts in profile.

*Inspection.* A rounded lobular swelling, situated in the region of the left sterno-clavicular articulation, extending over the median line to the right of the manubrium. It is about the size of a lemon, and fills up the suprasternal notch. It measures two and one-half inches in breadth by three inches in length. The clavicle is slightly elevated above its plane, and the whole left side of the chest is prominent. The tumor pulsates most markedly over the main prominence, and the pulsation is

slightly expansile in character and synchronous with the heart-beat. The right external jugular vein is enlarged and pulsates, and a branch of the left jugular coursing over the tumor is also enlarged and pulsates.

*Palpation.* The most prominent part of the tumor is covered only by skin and fascia, the bony structures having been absorbed, and a portion of the growth may be compressed and pushed back into the crater-like opening. Feeble diastolic shock is felt over the tumor. Expansile pulsation cannot be determined. There is no thrill, but the whole præcordia pulsates. The apex-beat is very much accentuated and felt in the left anterior axillary line in the sixth interspace.

*Auscultation.* A faint bruit is heard immediately under the *right* sterno-clavicular articulation and not over the tumor. This bruit is accentuated on forced inspiration and disappears on forced expiration. All cardiac sounds are accentuated, and there is good closure of both mitral and aortic valves.

*Percussion.* With the exception of a small spot of impaired resonance one inch in diameter, immediately to left of sternum and two inches below the apex of the swelling, the tumor-dulness merges into that of the heart. Dulness does not extend beyond the right border of the sternum, except at the manubrium. There is pain over the spine of the scapula on percussion, with general soreness over the whole of the left shoulder. There is a good pulmonary resonance right and left posteriorly, but the respiratory sounds are weak on the left side; no râles.

The urine was examined and found normal.

It became evident that we were dealing with a saccular aneurism, arising probably from the ascending or transverse portion of the arch of the aorta, with erosion through the left sterno-clavicular articulation and a portion of the manubrium, and that it had developed in such a manner as not to involve the vagus or recurrent laryngeal nerves.

The absence of many of the physical signs of aneurism, which continued to be a marked feature of this case, made it one of unusual interest. The pupils were equal, and responded normally to light. Dr. E. L. Vansant kindly made a laryngological examination and reported the larynx and vocal cords normal. Digestion seemed undisturbed, and there were no gastric symptoms. There was no thrill, and the expansile nature of the pulsation was not well marked. The bruit heard over the second right costal cartilage could not be referred to the sac of the aneurism, since it could not be heard over the tumor. The rapidity of growth, and the danger of rupture indicated by the thinness of the tissues over the most prominent portion of the tumor, brought up the question of operative procedure. The advisability of electrolysis with a watch-spring was considered, but was abandoned as a *dernier ressort*.

The following treatment was ordered: absolute rest in bed; potassium iodide grains 5 three times daily; venesection, six or eight ounces every three days; low diet. The patient was not bled for two days, during which time severe pain in the shoulder and left arm developed. On the third day, September 18th, she was bled eight ounces from the external saphenous vein at the ankle, with great relief of this distressing symptom. Between September 18th and 30th she was bled four times, chiefly for the relief of pain, and each time with marked success. On the 30th, fifteen days later, a second cast (Fig. 2) was made, and the following note of her condition was taken:



**Tumor:** since last examination the tumor has equally enlarged. It has extended upward on the neck, and there is now a well-defined sulcus separating it into parts. The right external jugular vein is dilated and larger than when first examined. The tumor is the seat of distinct heaving, in which the thoracic wall shares. This heaving is synchronous with systole and is more marked with expiration.

*Palpation.* Expansile pulsation is quite evident. The diastolic shock is better felt than at previous examinations. There is no thrill. Pulsation greatly increased during forced inspiration.

*Auscultation.* At point of contact of first rib with the right edge of sternum there is during quiet breathing a harsh and rather long systolic murmur, which is inaudible during forced, held inspiration and expiration. This murmur is probably not aneurismal, but might be due to pressure on the pulmonary artery. No murmur is heard in either carotid.

*Percussion.* Tumor gives dullness. Below the tumor there is resonance in the left second interspace; third rib, flatness; third interspace, dullness extending to the fifth rib, through which gastric tympany may be obtained.

*Heart.* Apex-beat visible in sixth interspace, and the point of maximum intensity is one inch to the right of the anterior axillary line, extending in the interspace for a distance of three inches. It is diffuse, regular, and unaccompanied by thrill.

Right border of heart-dullness corresponds to right border of sternum; left border corresponds to a line drawn just without the anterior axillary line.

*Auscultation of apex.* First sound is long, but not so muscular as one would expect from size of heart. There is no murmur.

The second sound is well heard in the tricuspid and aortic regions, and is obscure in character. No murmur is heard in these regions other than that described under head of tumor.

Auscultation at angle of the left scapular gives loud heart-sounds, but otherwise is negative. Respiratory murmur over right base posteriorly is well heard. Over left base the breath-sounds are weak and feeble, and when a forced inspiration is taken numerous liquid râles are heard. The respiratory murmur of left side is weaker than on the right side. The left lung seems to be compressed posteriorly and downward.

It was now evident that the aneurism was steadily increasing in size, and the prognosis became very grave. The tissues overlying the tumor were so thin that rupture seemed imminent. The sulcus across the apex of the swelling was probably due to a part of the sterno-clavicular ligament which had not been absorbed. Full doses of potassium iodide with mercurial inunctions were ordered with liquid diet, bleeding as necessary for pain, and absolute rest in bed.

In ten days she was taking fifty grains of potassium iodide, and one drachm of mercurial ointment was rubbed in over abdomen, chest, and arms daily. A marvellous change took place. The tumor steadily decreased in size, and the patient's general condition improved daily. Once she became slightly salivated, and the mercurial was omitted for a few days. It was also found necessary to reduce the iodide to twenty-five grains daily on account of an acne. When she left the hospital, one month after this treatment had been started, a third cast was made,

which clearly shows the very marked diminution in the size of the tumor. (Fig. 3.) Two weeks later, November 15, 1894, Dr. Judson Daland kindly assisted me in making the following notes of her physical condition:

Upon inspection it is found that the tumor has diminished about two-thirds in size, and the impulse is correspondingly decreased. The appearance of the superior portion of the chest in front is also materially altered, the most prominent point at present being situated immediately below the left sterno-clavicular articulation, which is sacculated, feeling like an exostosis from the manubrium, and is not painful to pressure. Immediately below this bony prominence a distinct pulsation may be felt, very like the apex-beat of a heart unaccompanied by thrill. The area would be described by a circle having a diameter of half an inch. The entire upper portion of the sternum is still bowed outward. At a point corresponding to the right edge of the sternum, on a level with the first and second ribs, a faint pulsation is felt, which becomes stronger as the mid-sternal region is approached, and is strongest in the fourth interspace, half an inch to the left of the left border of the sternum. Over this region a diastolic as well as a systolic shock can be felt, synchronous with the heart's action, but no thrill. It can be felt outward as far as the left mid-clavicular line. The apex-beat is diffused, violent, strong, and is felt in the seventh interspace in the anterior axillary line. The beat feels as though the heart struck the finger directly, and there is no thrill.

*Percussion.* A limited area of pulsation, immediately below the prominence and downward for a distance of one and a half inches, is flat, below which there is no impairment of the percussion-note for half an inch, and then comes normal sternal resonance. The right half of the manubrium is dull on percussion. In the left sterno-clavicular region there is marked dullness extending down to the second rib, at which point there is a small area of resonance. Below that there is a flatness extending down to the fifth rib. This whole area is within the left mid-clavicular line. There is resonance to the right of the sternum, excepting in the manubrial region, where normal pulmonary resonance is not met until the parasternal line is reached. In the ensiform region there is impaired resonance continuous with the dullness immediately to the left. The lower limit of this area is marked by the seventh rib.

Above the clavicle and sternum the tumor bulges into the left side of the suprasternal notch, lying under the sternal tendon of the left sterno-cleido-mastoid. It bulges slightly over the level of the clavicle and sternum. By pressing the finger in this region back toward the cervical vertebrae one feels a ledge for a distance of one full inch, which is without pulsation, painful to pressure, and feels hard.

*Auscultation.* In the first interspace at the right edge of the sternum the heart-sounds are heard with great distinctness. On long inspiration there is a distinct systolic murmur audible. In quiet breathing certain of the heart-beats are entirely without a murmur, and the murmur is best heard at the beginning of the expiration.

Directly over the swelling a blowing murmur is heard with systole during inspiration, but during expiration the heart-sounds are clear. This is the first time any murmur was heard over the swelling, and it is doubtless of aneurismal origin. The second sound is rather sharp. Over the pulmonic cartilage the second sound is accentuated and somewhat

ringing; no murmur. The heart-sounds are better heard below the manubrium, and at the ensiform both first and second sounds are heard equally well, the second sound being especially accentuated, but no murmur is audible.

The above examinations were all made in the standing posture.

When sitting, auscultation over the aortic cartilage reveals rather feeble heart-sounds and a faint systolic murmur. Over the swelling a distinct blowing, rather harsh systolic murmur is audible, coincident with each systole of the heart. The second sound is heard immediately thereafter, and is clear over the pulmonic cartilage. The systolic murmur at the aortic cartilage has a slightly higher pitch than that over the swelling. As the stethoscope is carried downward on the left to the third interspace near the sternum the systolic murmur is best heard. Over the apex-beat no distinct systolic murmur is audible, but there is a grating sound like that produced in hearts that are hypertrophied or dilated. Over the third interspace, in the left parasternal line, there is a distinct blowing, wavy, systolic murmur, differing markedly in quality and intensity from that heard over the swelling. There is no murmur in the carotids.

From these auscultatory signs it would appear that the systolic murmur heard over the swelling is of aneurismal origin because of location, quality, and want of distribution of the carotids. Further, the systolic murmur of different quality heard in the third interspace in the left parasternal line, having a wavy character, is probably due to compression of the pulmonary artery, as the tricuspid and mitral areas are free from murmur. The origin of the murmur heard at the aortic cartilage is doubtful. In the scapular region, near the inferior angle, a distinct systolic murmur is audible. In the axillary region no murmur is audible.

There is no difference in the radial pulses as regards rhythm or volume. The left is rather deeply situated and is hard to feel. The right is more superficial and is markedly thickened.

After leaving the hospital the patient led a quiet life, and took bichloride of mercury, one-twenty-fourth of a grain, and potassium iodide, gr. xx, three times daily.

This treatment was faithfully followed, with no marked change in her general condition or in the size of the swelling during the winter and spring and early summer of 1894. In August, however, thinking that she was cured, she gave up treatment, and October 15, 1895, she returned to the hospital for relief of distressing symptoms.

The swelling had increased considerably in size, and was very painful. She suffered much with headache, pain in left shoulder and arm, aggravated dyspepsia, a metallic, barking cough, and on two occasions during paroxysms of coughing she brought up a mouthful of bloody expectoration. At this time no marked changes were noted in the physical signs. She would not consent to remain in the hospital, so she was placed upon the old mixture of bichloride of mercury, one-twenty-fourth of a grain, and potassium iodide, gr. xx, three times daily.

She improved slightly under treatment until November 16th, when she was again admitted to the ward, suffering intense pain over left side of neck and left shoulder, radiating down the arm. The tumor was about the size of a small lemon, rounded, somewhat sacculated, firm, and tense, giving expansile pulsation, and painful on firm pressure.

She was bled on the 17th, 21st, and 28th, eight ounces each time, with marked relief of pain. At the same time one drachm of mercurial ointment was rubbed in the abdomen, arms, and legs, and she was given sixty grains of potassium iodide daily.

The tumor increased in size, and on December 4, 1895, her condition was as follows: the tumor is a rounded, globular swelling about the size of an orange, measuring three and one-fourth inches in all directions over its surface. It bulges above the clavicle, which is raised above its plane, and it fills up the suprasternal and supraclavicular fossæ. It is less firm and tense than at last examination and gives expansile pulsation.

The left shoulder droops, and there are general pain and tenderness on pressure.

The area of flatness may be described by a line drawn from the middle of the left clavicle to the fifth rib just above the nipple, from here horizontally to the mid-sternal line, then to the base of the tumor, and around it to the right sterno-clavicular articulation. Below the tumor this flatness merges into cardiac dullness, which extends to the left anterior axillary line as far as the seventh rib. Here the apex-beat can be seen and felt strongly pulsating. The first sound is long and muscular, unaccompanied by murmur. A decided bruit can be heard all over the area of the tumor-flatness, and there is faint diastolic shock. A short medium-pitched systolic murmur is heard to the right of the sternum at the second costal cartilage. This murmur is transmitted into the right carotid. The second sound is sharp and accentuated.

Bronchial breathing with rough, moist râles is heard under the outer half of left clavicle down to third rib. Posteriorly there is general broncho-vesicular breathing with moist râles on left side.

On right side posteriorly and anteriorly the breath-sounds are more pronounced, somewhat rough, but unaccompanied by râles.

Conclusion: a large saccular aneurism, its upper portion having eroded the bony structure. The left lung is compressed posteriorly and laterally, and the heart is pushed down and out. The aneurism probably arises from the ascending or transverse portion of the arch.

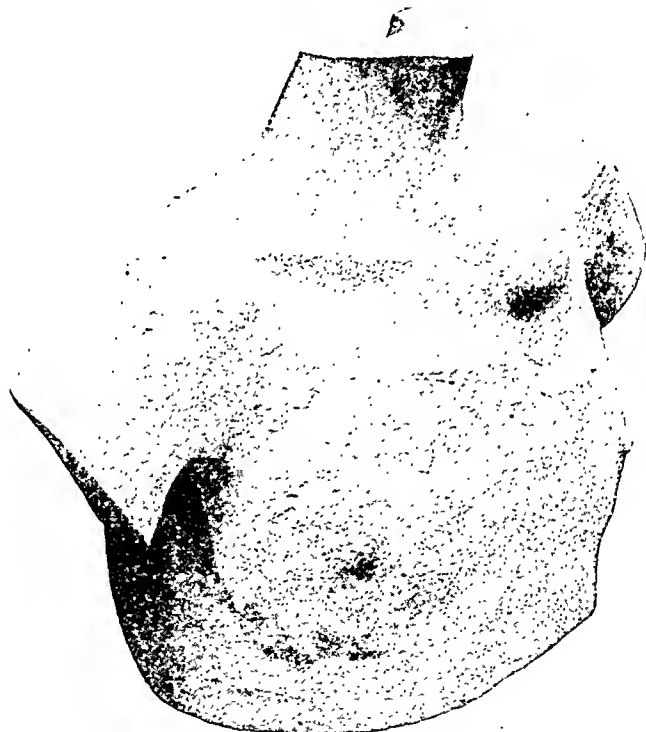
The patient improved steadily under treatment, and on December 24th was discharged in a comfortable condition. The tumor became firm and slightly smaller. The pain had ceased in the neck, arm, and shoulder.

In spite of warning she undertook housework, and January 15, 1896, she again returned to the hospital on account of pain. At this time another plaster cast was made. (Fig. 4.) She improved under treatment, and left the hospital at the end of ten days. She then reported weekly, and continued to do well until April 7th at 4 A.M., when she suddenly developed agonizing pain under the left axilla, which increased in severity during the day, requiring one and a quarter grains of morphine with atropine for relief. There were nausea and vomiting with painful cough. The breathing was labored and rapid. Temperature was normal. Pulse 112. Respiration 36. The physical signs could not be differentiated owing to the loud breathing. I suspected an acute pleurisy or else a sudden dissection of the arterial walls involved in the aneurism and consequent increase in the size of the tumor. The chief pain was situated in the *right* axillary region. She was bled twelve ounces, and morphine and atropine were given

subcutaneously for relief of pain, and the next day, April 8th, she was again sent to the hospital, and the following notes were made of her condition:

*April 8, 1896.* Breathing stertorous, labored, frequent, averaging 26, and frequently interrupted by a loud ringing cough. Tumor over upper portion of sternum is the size of large orange and is more than a hemisphere. During cough it becomes tenser and larger. Impossible to judge of cyanosis. Matrix of nails is normal. In sitting position with the head bent downward the chin rests upon the tumor. There is marked pulsation, which upon palpation feels like the heart. The diastolic shock is marked. Expansile pulsation is well felt. The wall of the sac is made up of skin, fascia, and connective tissue, and has an apparent thickness of a quarter-inch. The thickest portion is in the centre. Anteriorly there is no thrill.

FIG. 4.



Plaster cast made January 17, 1896.

*Auscultation.* Over central portion of tumor is a strong, low-pitched, systolic murmur mixed with the cardiac first sound. Second sound accentuated. A systolic murmur of different quality and of higher pitch is heard below the tumor to left of sternum. A murmur is heard in the left carotid. No aortic diastolic murmur is here audible. At ensiform there is a murmurish sound of diastolic time. The apex is plainly felt as low as sixth rib outside of nipple-line, occupying an area of two inches in diameter. It is forceful, and indicates that the

heart is closely applied to chest. No thrill, no murmur, but the muscular element of the sound is increased.

Pupils symmetrically contracted, *probably due to morphine*. Pulses irregular in time, and the right pulse much smaller in volume than the left. At times the pulses are synchronous and again are not synchronous.

*Lungs.* Impaired resonance over both bases. The air enters both lower lobes with the same degree of power. The breath-sound is harsh, unaccompanied by râles, and there are no friction-râles. Occasionally a large rhonchus is heard apparently from a compressed trachea or one of its branches. A prolonged, loud, harsh murmur is heard midway between the border of the scapula and the spinous process of the vertebra on the *right* side, and extends from the fifth to the twelfth dorsal vertebral spines. During quiet breathing but little air enters either base.

FIG. 5.



Photograph taken April 11, 1891.

Note the collar of flesh, the drooping shoulder, and the forward position of the clavicle.

Over the left scapular region there are signs of compressed lung, and the heart-sounds are plainly audible. Dr. A. W. Watson kindly made a laryngological examination and reported that he found the vocal cords normal. There is a slight deviation of the trachea to the right.

Treatment ordered: mercurial inunctions and iodide of potassium.

Two days later, April 10th, she was bled six ounces, for pain, at 8 A.M.

At 1 P.M. on the same day a violent attack of dyspnoea came on very suddenly, with sharp pain in right axillary region. The patient was deeply cyanosed, and she seemed about to die of asphyxia. A vein was

immediately opened and twenty-eight ounces of blood drawn. During the bleeding the cyanosis disappeared, breathing became easy, and pain subsided. The tumor, which had been firm and unyielding, became flaccid, and patient rested easily. Later in the afternoon she slept for two hours. On the following day, April 11, 1896, the photographs were taken. (Figs. 5 and 6.)

*May 12th.* The patient has steadily improved under treatment, and, in spite of frequent venesections for the relief of slight attacks of dyspnoea and pain, she is gaining strength. She is now able to be out of bed and walk about the ward for a few hours daily. The inunctions were pushed to salivation and then stopped. The potassium iodide has been gradually diminished until, on the 5th of May, she was taking none at all. At this time a tonic pill of iron, quinine, and strychnine was ordered. Her appetite is good, bowels regular, and all functions normal.

FIG. 6.



Photograph taken April 11, 1896.

The wall of the sac seems to be firm and elastic, and about from one-half to one-quarter of an inch in thickness. The walls seem to be of uniform thickness. There is no point of marked thinning indicating danger of rupture externally.

The sac has not changed in size or appearance, but the walls have become firmer and thicker under treatment. Frequent examinations of the urine have been made during the progress of the case with negative results.

The aneurism is undoubtedly a large one, and the fact that such extensive erosion has taken place, allowing protrusion of so large a part of it, accounts in some measure for the absence of many pressure-symptoms, and, therefore, absence of pain. Pepper (*American Text-book of*

the *Theory and Practice of Medicine*) cites two cases illustrating this point—one in which an aneurism of the ascending arch had eroded the sternum, appearing externally as a large tumor, and finally rupturing externally without having caused any decided subjective symptoms excepting dyspnoea; another in which the tumor had reached such a size as to cause dulness over a large part of the thorax to the right of the sternum without causing pain.

The question of the location of the aneurism is interesting. An aneurism of the ascending arch causes erosion to the right of the sternum. In this case the erosion is of the left sterno-clavicular articulation and contiguous structures. The physical signs show that the larger part of the sac is within the thorax and to the left of the sternum. The fact that so many pressure-symptoms have been and remain absent argues against the view that it is an aneurism of the transverse arch, because, owing to the small space between the sternum and the spinal column, tumors in this region usually give rise to severe pain and other symptoms of pressure. One would expect an aneurism of the descending arch to develop posteriorly.

Occasionally small aneurismal dilatations of the sinuses of Valsalva have been noted, and Bramwell has reported one case in which a large aneurism had its origin at this point.

Gray thus describes the sinuses of Valsalva: "Between the semilunar valves and the commencement of the pulmonary artery are two pouches or dilatations, one behind each valve. These are the pulmonary sinuses (*sinuses of Valsalva*). Similar sinuses exist between the semilunar valves and the commencement of the aorta; they are larger than the pulmonary sinuses. The pulmonary valves are situated behind the junction of the left third rib with the sternum."

It has occurred to the writer that this aneurism may arise from one of the pulmonary sinuses of Valsalva. This might account for many of the peculiar features of this case, namely, the development of the sac anteriorly and to the left of the sternum; the fact that the sac fills up a large portion of the upper half of the left thorax; the absence of involvement of the vagus and recurrent laryngeal and of the sympathetic nerves; the peculiar and unusual murmurs; the absence of irregular and asynchronous action of the radial pulses; the absence of tracheal tugging.

An aneurism in this situation, unless markedly sacculated and the aneurismal opening from the vessel very small, would give rise to violent attacks of dyspnoea. This has always been a marked feature of the case, and especially so during the last few months. It is fair to presume that the opening into the sac has increased materially in size in this time.

The writer does not mean to urge this view of the case. It is mentioned only as being worthy of consideration. It seems more probable



that the aneurism arises from the left lateral wall of the ascending arch, and has developed anteriorly and to the left, a portion of its upper part also bulging into the right pleural cavity just below the right sternoclavicular articulation and to the right of the manubrium. Also, that the opening from the aorta into the sac was at first very small, accounting for the fact that for a long time no aneurismal bruit was heard, and that the bruit which became audible later was due to increase in the size of the opening, allowing a stronger current of blood to enter the sac. This theory is borne out by the murmur which, in the pulmonary area, was noted November 15, 1895, and which was heard most distinctly while the patient was in the sitting position, slightly bent forward, causing pressure by the sac upon the pulmonary artery.

The question of the probable origin of the aneurism is now, however, of minor importance in comparison with the actual condition of its walls and the size of the opening into the vessel from which it springs. Upon the solution of these questions should depend our decision as to the propriety of attempting to obtain coagulation of blood and the deposit of the white, laminated fibrin upon the walls of the sac by means of MacEwen's method. One or more strong needles are used in this method to pierce the sac, in order to scratch and irritate the inner walls as much as possible. These needles may be allowed to remain in from one to four or five hours, or they may be withdrawn immediately. MacEwen reports consolidation and cure in two cases (*Lancet*, November 22, 1890), one an aneurism of the thoracic aorta and the other of the subclavian. He also reports another case of femoral aneurism, in which the autopsy showed that the deposition of the white, laminated fibrin was greatest where the sac-irritation had been most thoroughly applied.

Weir and Page (*New York Medical Journal*, May 7, 1892) report an aneurism of the ascending aorta treated without success by this method. The needling was done three times during the first week of treatment, and as no improvement took place it was not tried again. The patient died from rupture of the sac about two months later. The autopsy showed an aneurism measuring  $6\frac{1}{2}$  by 8 inches and filled with a post-mortem clot. The walls were very thin and the rupture had taken place posteriorly. Nowhere was there to be seen more than a trace of fibrous deposit and no evidences of the needling were visible.

The method is a rational one, however, and has been successful in the hands of its originator and in a few other cases. It seems to me that it is applicable only under certain conditions, and these are a thick-walled sac, a sac in which there is only a moderate amount of expansile movement, and especially and only when the opening from the vessel is small. In order to determine the latter point in the present case arrangements have been made to have a radiograph taken of the thorax. There is a chance of gaining important information by this

means, especially if there are calcareous deposits and atheromatous changes in the walls of the aorta or of the sac. In addition a radiograph will show the changes which have taken place in the bony structures by reason of erosion and internal pressure. The writer proposes to make a supplementary report based upon this picture should it prove successful.

One word in regard to treatment. That which has been carried out in this case has proved so successful that some hesitation is felt in making any change.

A short time ago it was thought advisable to stop the mercury and the potassium iodide on account of intolerance. Since then the patient has been taking only a tonic pill of iron, quinine, and strychnine. It is proposed before returning to the mercury and iodide to try the effect of calcium iodide in full doses. This remedy has recently been used with apparent success in these cases. The result will be reported at some future time.

The points of unusual interest in the case which has been related are as follows:

1. The length of time during which the aneurism has been known to exist. It has been two years since the first symptoms appeared, and the patient has during the greater part of the time been able to be about on her feet, doing light work.

2. The almost entire absence of the usual pressure-symptoms. There has been no evidence of involvement of the vagus or recurrent laryngeal nerves or of the sympathetic nerve. Occasionally there has been pain radiating over the left shoulder and down the left arm, showing that the cervical plexus has been involved.

3. The remarkable result of the therapeutic measures, as shown by the decided decrease in the size of the tumor and the repair of the eroded bony structures at one time during the progress of the case. This point alone is sufficient to make the case worthy of record, and one which may be called unique in the history of thoracic aneurisms.

4. The decided benefit gained from venesection. On one occasion at least the patient's life was undoubtedly saved by the prompt opening of a vein and the withdrawal of twenty-eight ounces of blood.

5. The question of the origin of the aneurism.

I desire to express my thanks to Dr. A. W. Booth, to whom I am indebted for the plaster models from which Figs. 1, 2, and 3 were made; also to Dr. Keffer for the model of Fig. 4. Dr. H. C. Williams, resident physician, has rendered valuable assistance in many ways, and I take this opportunity to express my appreciation of his work.

## REVIEWS.

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A PRACTICAL TREATISE ON MEDICAL DIAGNOSIS FOR STUDENTS AND PHYSICIANS. By JOHN H. MUSSER, M.D., Assistant Professor of Clinical Medicine in the University of Pennsylvania, Physician to the Philadelphia and the Presbyterian Hospitals, etc. Second edition, revised and enlarged. Illustrated with 177 woodcuts and 11 colored plates. Philadelphia and New York: Lea Brothers & Co., 1896.

Two years ago the writer, in reviewing Musser's *Diagnosis* in this JOURNAL, bespoke for it a cordial reception from the professional public. The prediction has come true. The evidence is the exhaustion of the first edition and the publication of a second within a little over two years.

This second edition shows careful revision. Not only have typographical errors been corrected, but there is much additional matter in the text, and several new illustrations have been added, so that the volume is larger than the former one by fifty pages.

We would speak with especial commendation of the alterations in the illustrations. Several new ones have been added that are of great value; *e. g.*, the diagrams under the head of Diseases of the Heart. Inferior cuts have been replaced by superior ones, as is seen in the illustrations of the emphysematous and phthisical chests. And several of the time-honored and shopworn illustrations of tube-casts and urinary deposits have been withdrawn, and in their places we see fresh, clear original cuts. If we were disposed to criticise, we should say that Musser has been less fortunate in his representation of the blood in various diseases. The cut from Rieder, on page 736, gives but an imperfect idea of the plasmodium, and the plate opposite page 812 is scarcely more successful. The plasmodium can best be studied in the fresh specimen, and a figure representing it in this state would be better than either of those we have mentioned. The figures from Golgi (page 815) are, to our mind, much truer to nature, though perhaps a trifle diagrammatic. We have seen no representations of the plasmodium that compare for purposes of study or of teaching to those in Thayer and Hewetson's monograph. The description of the plasmodium given by Musser in the text is, perhaps, a little too meagre. The plate representing leukaemic blood (p. 744) would be improved, we think, had a better field been selected. We admit that we often see many such fields even in carefully prepared specimens. But for a text-book illustration one is justified in picking out a place where all forms are clearly distinct—*i. e.*, a typical place. In the figure in Musser the running together of the red corpuscles gives one the impression of a poorly prepared microscopic specimen.

As was said in the review of the first edition, we regard as of the highest value the general introductory chapters and the chapters introductory to the study of the diseases of the various organs. Too often the physician, in his haste to get at the individual disease, skips the introduction. He who does that with Musser's work misses much that is valuable and fails to obtain that broad, general view of the subject that it is the evident desire of the author we should obtain. As bearing directly upon this point and containing much of truth, we quote from the preface:

"Diagnosis, being a practical art, should be held to include not merely the recognition of a disease or a complication of diseases, but also a determination of the *health-value* of the patient. Thus in a case of pneumonia not only should the presence of the malady be established, but the functional condition of all the organs should also be investigated, in order that the rational treatment may be prescribed and a rational prognosis given. In other words, the physician should never forget that a patient is a unit, comprising closely interacting organs, and that the response to treatment will be satisfactory in proportion to its adaptation to the condition of the entire organism."

"Success in treatment follows only upon diagnosis of the most comprehensive character, and, furthermore, the *status præsens* should be clear to the physician, not only at the outset, but also at every stage of the disease."

He who reads Musser aright will, we believe, get this broad conception of disease, will see the connection between "closely interacting organs," and will be enabled to make the comprehensive diagnosis that leads to rational treatment.

The work is fully up to date in matters of bacteriological, chemical, and microscopical diagnosis. But it is to be remembered that Musser's book embraces as well the facts of physical diagnosis—inspection, percussion, auscultation, etc.—and that the value of the subjective history is clearly set forth. It combines, therefore, the merits of works devoted solely to chemical and microscopical diagnosis, those dealing mainly with physical diagnosis, and those laying chief stress upon the subjective history. It was a difficult task to effect such a combination. That Musser has succeeded will be generally admitted, as the success of his first edition attests.

In reading the book we have marked several places as worthy of special commendation. We note as particularly vivid word-pictures the description of the actions of the healthy baby as compared with those of the rickety child, or the sufferer from meningitis (p. 58); the description of the typhoid state (p. 109) and of internal hemorrhage (p. 182); the complete and systematic exposition of hæmoptysis (p. 302).

His explanation of the subject of the reaction of degeneration is clear and easily comprehended by the student (p. 842). We fully agree that the sphygmograph is an instrument whose value depends upon the personal experience and skill of the physician employing it (p. 396).

We suppose every reviewer feels that he has not done his duty unless he hunts carefully and succeeds in finding some little statement that is incorrect, or at least one on which he may "beg the gentleman's leave to differ." So we would suggest that our author has left us a little in the dark as to whether he expects us to make diagnoses of capillary

bronchitis and of broncho-pneumonia, distinguishing them as two pathological and clinical entities (pp. 308 and 325). While the statement is certainly true that a diastolic murmur can generally be set down as organic, there are, we believe, occasionally met with, diastolic murmurs that are not organic (p. 386). The statement that the capillary pulse is a "sign of aortic insufficiency" (p. 390) is a little misleading, as it appears to mean that the finding of a capillary pulse means aortic regurgitation. Frequently a capillary pulse may be seen in conditions other than this particular valvular lesion.

But these are trivial matters. The book as a whole and in its details is of superior merit. It has come to stay, and is destined, if the author will constantly keep it abreast of the times, to go through many subsequent editions.

J. B. H.

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MEDICAL JURISPRUDENCE FORENSIC MEDICINE, AND TOXICOLOGY. By R. A. WITTHAUS, A.M., M.D., and T. C. BECKER, A.B., LL.B., with the assistance of many collaborators. Volume IV. 8vo., 860 pages and indexes. New York: Wm. Wood & Co., 1896.

THIS is the concluding volume of the most comprehensive work on legal medicine yet issued under American auspices. In this age of "Systems" it is not surprising that a topic so largely scientific and comprising the border-line between law and medicine should be treated in a comprehensive manner. The work, as a whole, has exhibited the advantages and defects of the method. When many specialists contribute, there will be apt to be inequality in the literary and scientific execution of the various articles. All who are successful or eminent in a particular field are not necessarily capable of communicating their knowledge clearly and elegantly. It is presumed to be the function of the editor to supply the finishing touches, but he, too frequently, neglects this drudgery. Nor is it certain that, even under the best editing, the selection of collaborators will be made with an eye single to the interests of the work. Personal feeling will always have some sway, and hence most of these encyclopædic contributions to science have a predominance of contributors local to the editor's field of labor.

In the volume under review these general criticisms are not germane, for it is entirely the work of the senior editor of the System. The reputation of Dr. Witthaus is a sufficient guarantee of his ability to deal properly with the topic to which the volume is entirely devoted. He unites a large experience as a toxicologist with thorough familiarity with general chemistry, both as a teacher and writer, and we turn over the pages of the book with the assurance that the expert will find it a valuable guide.

The books open with a historical essay in which is given some interesting information concerning the celebrated poisoners of antiquity, though, of course, a large part of these stories is subject to the uncertainties that belong to all accounts of the marvellous or startling. In the chapter devoted to General Considerations we note some statistics of poisoning as recorded in New York City, from which it appears that illuminating-gas has become of late years one of the most frequent causes of accidental and suicidal poisoning. This is probably due to

the substitution of water-gas for the old-fashioned coal-gas, the latter having much less toxic power.

The portion of the book devoted to discussions of definitions and limitations of toxicology, to the manner of action of poisons, treatment, diagnosis, methods and indications of autopsy are all comprehensive and excellent, and we need not review them in detail. In describing the methods of conducting the scientific investigation for the detection of any poison, Dr. Witthaus enters into some details concerning which we are partly in agreement and partly not. He observes that the analysis should be made by a chemist of experience, who is also a graduate of medicine. We may accept this as a safe rule, but the latter qualification is often not regarded as essential. We cannot, however, agree with the next statement, namely, that the analysis is best made by one expert, and that the joint investigation by two analysts is to be disapproved. It is possible that such arrangements may, at times, lead to delay and even to unpleasant differences of opinion; but we think that in view of the unseemly contests between opposing experts in important trials a great advantage is gained by having two competent witnesses to the analytic results or pathologic conditions. This is especially true when the tests or observations must be given by description only. In many cases of poisoning a portion of the material which has been administered may be reserved by the expert and submitted to the court for further tests, if need be; but in many other cases no such tangible evidence can be brought forward; the tests are mere color-changes which must be described from notes, or, if shown at all, it must be by the use of material not obtained from the body examined. In this class of cases, it seems to us, great advantage will result if the concordant observation of two competent persons is available. Another contingency that may arise is the inability of an expert to testify, by which proper trial may be impossible. In one case of which we know, an expert was too sick to be present at the trial; fortunately another analyst had been joined in the investigation and assisted at it throughout, and the trial went on satisfactorily. In another case the expert who conducted an investigation died suddenly before the trial took place, and it was impossible to pursue the prosecution.

Elaborate descriptions are given for the extraction of organic poisons. The liability of standard, and presumably pure, reagents to contain poisonous bodies shows us one of the pitfalls of this line of work and leads us to regard with doubt many of the earlier investigations in this field. As a striking example of this source of error, we may quote from a recent paper by Vaughan and Perkins, who state that a sample of ether, which was intended for analytic use, contained so much of a poisonous impurity that the residue from fifty cubic centimetres killed a guinea-pig in ten minutes.

The question as to which is the most important poison may be considered answered by the fact that 184 pages (more than one-fifth of the book) are devoted to consideration of arsenical compounds. In discussing the lethal dose of ordinary arsenic (arsenious oxide), Dr. Witthaus rejects the case reported by Dr. Castle, upon the authority of which most toxicologists have fixed the minimum lethal dose for an adult at 0.13 gramme (2 grains). He considers that a recently produced abortion had much to do with the death of this patient.

We regret to note that no space is given to the consideration of

chronic lead-poisoning. It is passed over with the allusion that it is industrial and not forensic, but the topic has generally been included in treatises on toxicology proper, and certainly the analytic methods, which are difficult and important, should be described. The detection of lead in cases of acute poisoning is easy, but the minute amounts of lead encountered in cases of chronic poisoning require special methods, and we would have been glad to have had them discussed by a competent authority. The liability of lead-compounds to occur in small amounts in food, either by accident or adulteration, makes the topic one of more than industrial importance.

Perhaps the most interesting part of the book is the discussion of the analytic questions that arose in the Buchanan case. Dr. Witthaus was the principal witness for the prosecution, and it was in this trial that the lawyer-doctor, O'Sullivan, shot, meteor-like, across the forensic sky. The value of Dr. Witthaus's color-tests for morphine was combated by Dr. Vaughan, who contended that the same reactions could be obtained from putrefactive products, especially those resulting from decomposition out of contact with air. We need not enter at length into the details. Dr. Witthaus quotes liberally from the official report, claiming, and we think rightly, that the "imitations" that Dr. Vaughan obtained before the jury by applying the various morphine-tests to indol were not such as to invalidate the value of these tests when properly applied. Yet Dr. Vaughan, in the recent edition of his work on *Plomaïnes*, referring to this case, asserts broadly "that all of the tests obtained by the experts were duplicated with putrefactive products." We agree with Dr. Witthaus that this statement is disingenuous.

There is no doubt, however, that the color-tests for alkaloids must be conducted with precision and with constant regard to the possible fallacies from ptomaïnes, and it is also clear that for a time, at least, such testimony as that given by Dr. Vaughan in the Buchanan trial will imperil the evidence given by the prosecution. With mineral poisons some portion of the substance may be recovered from the test-liquids and shown in a tangible form, but the tests for alkaloidal poisons are mostly "swan-songs"; that is, the poison is destroyed in giving evidence of its presence, and all that can be brought before a jury is the description of color and forms, with the possibility of dispute as to the exact observations.

The book will be of good service to toxicologists and will, among other advantages, serve to give uniformity to analytic methods. The literary style is excellent. The new spelling, of which Dr. Witthaus was an early champion, is used *in excelsis*—namely, sulfur, sulfid, iodin, iodid, etc.

The original sources have been consulted in many instances, with the result that more than one case which has been doing duty in toxicologic literature has lost its value.

The general typography is good, as regards the text proper; but the foot-notes, which are very numerous, are not so satisfactory. The index is rather scanty. Few illustrations are given, and most of them could have been omitted. The pictures of mercury and arsenious oxide deposits (pp. 494-95), morphine crystals (p. 724), and strychnine (p. 781), are mere smudges which can be of no benefit to a tyro and no use to an expert. In fact, drawings of crystals, that can be readily obtained for actual observation, seem to us to be a waste of money and labor.

The proper function of illustration in a work of this character is to give accurate drawings of objects that cannot be readily obtained or prepared. H. L.

PTOMAÏNS, LEUCOMAÏNS, TOXINS AND ANTITOXINS; OR THE CHEMICAL FACTORS IN THE CAUSATION OF DISEASE. By VICTOR C. VAUGHAN, Ph.D., M.D., Professor of Hygiene and Physiological Chemistry in the University of Michigan and Director of the Hygienic Laboratory; and FREDERICK G. NOVY, Sc.D., M.D., Junior Professor of Hygiene and Physiological Chemistry in the University of Michigan. Third edition, revised and enlarged. 8vo., pp. 604. Philadelphia and New York: Lea Brothers & Co., 1896.

PROBABLY no department of pathology has a more living interest to the practitioner of medicine at the present time than that which has to do with the various intoxications of the body and with the structural and functional disturbances directly resultant therefrom. With the growth of our knowledge of the bacteria and of their relations to disease, evidence has continually accumulated to the effect that their principal action upon the tissues is due to certain poisonous substances (toxins) elaborated in the course of their growth, and there is even now much to support the view that the specific peculiarities of the lesions of the various infectious processes depend chiefly upon the individual peculiarities of the poisons concerned.

Again, recent researches into the etiology of many of the lesser maladies which clinicians have been wont to class as "minor ailments," attributable in many instances to digestive disorder, are in reality dependent upon intoxication of the system by various toxic principles elaborated in the course of alimentary putrefaction or as the result of imperfect nutritional metabolism. In this category may now be classed many of the temporary causes of indisposition so frequently confronting the general practitioner, such as headache, malaise, nervous hyper-excitability, neurasthenia, etc.; conditions often slight in themselves, but of much real moment as incapacitating the sufferer for the full performance of his work.

It is with the various poisons responsible for these conditions that the book before us deals, and in it we have the most exhaustive as well as the most recent presentation of the subject with which we are acquainted. That the importance of the subject and the manner of its treatment by Vaughan and Novy are appreciated is attested by the fact that the work is now in its third edition.

After the usual preliminary chapters introductory to the subject-matter of the work, which include among other things a careful historical sketch of the growth of our knowledge of the bacterial poisons in general, we are introduced to an account of the poisonous principles which have been found in various articles of food and which have from time to time given rise to cases of serious and often fatal poisoning. Here we find described the effects produced by the eating of poisonous mussels, oysters, eels, fish, sausage, meats, cheese, milk, ice-cream, bread, etc., and are given an insight into the nature of the poisons concerned



in their production. In the chapter which follows, and which is new in the present edition, is given a brief statement of the most approved method of detecting the poisons in suspected foodstuffs.

In the four succeeding chapters, which occupy nearly one-fourth of the book, we have a detailed statement of the relation of the bacterial poisons to infectious diseases, in the course of which each disease is separately treated and the present status of our knowledge of its toxins is recounted. Here, too, we find a statement of the principles of immunity, of antitoxins and serum-therapy, as well as some account of the general germicidal power of the blood-serum and of those of its constituents to which this power is attributable. These chapters are of great interest in view of the rapid progress which has recently been made in our understanding of these most important subjects.

To the chemist and toxicologist the five chapters which follow are of especial interest, since they detail the methods of extracting ptomaines, toxins, and leucomaines from mixtures of organic substances and present their various chemical reactions. To the close similarity as regards chemical reactions of some of the bacterial products and a number of the alkaloid poisons a special chapter is devoted.

The work closes with a short discussion of some of the "autogenous diseases," by which are meant those diseased conditions induced by poisonous substances produced within the body by its own cells in the course of their metabolism. Here we find a statement of the poisonous effects of pepton, albumoses, "peptotoxin," and of the various members of the uric acid and creatin groups of leucomaines.

While it is impossible within the compass of a review more than to outline the scope of a work like that before us, it is hoped that enough has been said to show the vital interest of the subject treated and to indicate the manner of its presentation.

An exhaustive bibliography and a carefully prepared index materially increase the usefulness of the book.

J. S. E.

A TEXT-BOOK OF HISTOLOGY, DESCRIPTIVE AND PRACTICAL. FOR THE USE OF STUDENTS. By ARTHUR CLARKSON, M.B., C.M. Edin., formerly Demonstrator of Physiology in Owen's College, Manchester; late Demonstrator of Physiology in the Yorkshire College, Leeds. Pp. 554. With 174 colored illustrations. Philadelphia: W. B. Saunders, 1896.

In the preface of the book before us the author states that his purpose "in this work has been to furnish the student of Histology, in one volume, with both the descriptive and practical parts of the science."

With the scope of the book thus clearly outlined we are somewhat restricted in the range of our criticism, for it would be an act of great injustice to the author to condemn his book because it does not meet the requirements of the specialist, when it has been designed expressly for the student whose needs are widely different. It behooves us, therefore, first to ascertain the needs of the student, and then to determine in what manner the author has acquitted himself of his task.

A book adapted to the understanding of one about to enter upon a

course of scientific study should, above all else, be clear and concise, with explicit directions regarding technical matters, and without lengthy discussion of complex problems or polemical subjects.

After a careful perusal of Mr. Clarkson's book we are reluctantly forced to the conclusion that it does not meet all of these requirements.

Chapters I. and II. are devoted to the consideration of matter pertaining to the preparation of tissue for microscopic study. Formulas for many of the hardening, decalcifying, injecting, and staining solutions in general use are given, but the directions as to their manner of employment are vague and incomplete. We feel quite confident that a student having no other guide than Mr. Clarkson would soon become involved in difficulties that could have been prevented by a few well-worded sentences.

To illustrate our remark we have space for but a single example. On page 13 the author mentions the methods for hardening tissue in saturated watery and alcoholic solutions of corrosive sublimate.

In the use of such solutions precipitation of the corrosive sublimate is quite likely to happen, and if the precipitate be not removed, the sections will be valueless for microscopic study, and yet the author has given no directions to this end.

The animal cell, the blood, and the lymph and chyle are treated of in Chapter III. The most important part of this chapter, that treating of the blood, is a lamentable failure.

The author's labored efforts to give a brief and concise description of this important tissue are painfully manifest. He seems to lack the complete knowledge of the arts of selection and condensation which is essential to the construction of a successful work of this kind. Nowhere throughout the book is this fault so evident as in the description of the origin of the red blood-corpuscles and the primary blood-vessels.

The conclusions at which we arrive from Mr. Clarkson's description are that the red blood-corpuscles are epithelial cells derived primarily from epithelial cells of the mesoblast, and that the cells forming the lining of the bloodvessels and the walls of the capillaries are also epithelial cells derived from mesoblastic elements indistinguishable from those that give birth to the red blood-corpuscles.

This placing of the red blood-corpuscles among the epithelial cells is new to us and somewhat startling, as we had always considered them as belonging to the category of connective-tissue cells.

In Chapter IV. we find described as "simple squamous epithelium" the cells covering the free surfaces of serous membranes and lining the heart, the bloodvessels, and the lymphatic vessels. At the present time many eminent pathologists regard these cells as a form of connective tissue, and they no longer refer to them as epithelium, but as endothelium.

Epithelium and connective tissue differ from one another in many essential features; indeed, they represent two distinct types of tissue, and throughout life each retains its own distinctive characteristics. In his excellent text-book on *General Pathology* E. Ziegler states clearly and succinctly the principle of an almost universally accepted doctrine, which we take the liberty to quote: "Every tissue capable of growth furnishes formative cells only for tissue like or closely allied to it."

Thiersch, Baumgarten, Raab, Thoma, and others have conclusively

proved that frequently in the process of repair the endothelial cells proliferate, and the resulting cells often produce connective tissue.

Were Mr. Clarkson's view the correct one, it would be impossible to reconcile this fact with the above-mentioned doctrine.

The author essays a description of the origin of the lymphatic vessels and glands in Chapter VIII., but is so confusing in his treatment of this interesting matter that we doubt if he clearly understands it. The remaining chapters are somewhat better than those to which we have called particular attention, but not one is wholly free from objectionable features.

Where Mr. Clarkson treads old and well-beaten paths he does fairly well, but where he attempts a little excursion into new and less familiar fields he becomes confused and wanders in an aimless fashion. We do not hesitate to say that he has failed to give us a book that we could recommend to the student, particularly the medical student. With the latter the study of histology must be considered as subsidiary to that of pathology, and, if he were to become well grounded in the principles of histology as set forth by Mr. Clarkson, he would have much to unlearn before he could appreciate the cell-changes involved in many of the morbid processes.

The illustrations, of which there are many, form the most pleasing feature of the book; the coloring is excellent and the drawing accurate, and our chief regret in closing this review is that we cannot bestow the same praise upon the text.

D. B.

VORLESUNGEN ÜBER DEN BAU DER NERVÖSEN CENTRALORGANE DES MENSCHEN UND DER THIERE. By DR. LUDWIG EDINGER, Professor in Frankfurt-am-Main. Fifth enlarged edition. Leipzig: F. C. W. Vogel, 1896.

LECTURES ON THE STRUCTURE OF THE CENTRAL NERVOUS SYSTEM IN MAN, ETC. By DR. LUDWIG EDINGER.

THE fifth edition of Edinger's work is about twice the size of the fourth, and contains 113 new figures, of which 99 are devoted to the section on Comparative Anatomy. The book is divided into three parts: the first is an introduction to the anatomy of the central nervous system, the second treats of the development and comparative anatomy of the brain of the vertebrata, and the third gives us the special anatomy of the encephalon of the mammalia, dealing especially with that of man.

We find much that is new, even in those portions which are taken from the former edition. One can but admire the restless energy of the author which drives him to present to the reading public a new edition of his book every two or three years.

Edinger is still conservative in his views regarding the presence of connective tissue within the central nervous system; the septa, however, which radiate toward the periphery of the cord consist of neuroglia.

We notice with pleasure the tribute paid to the scientific work of our countryman, Hodge.

The axis-cylinder of a nerve-fibre is supposed to be composed of

separate fibrils, and the achromatin of the cell-body is not structureless. Recent investigations have shown that it contains fine fibrils, which enter and leave the cell-body through its processes. We have here a new element to study in the morbid cellular changes. Great importance is attributed to the condition of the nucleus in degenerative processes, for restoration of the cell is possible so long as the nucleus is unaltered.

Edinger speaks of the vast number of sensory fibres which are found in all parts of the body—in the liver, kidneys, lungs, etc.—and which are necessary for the unrecognized reflexes on which life itself depends. An interesting example is given in the inability of a person to swallow after cocaine has been applied to the pharynx. Probably many motor disturbances of hysteria are due to this cause. We may refer in this connection to the experiments of Mott and Sherrington. These investigators, by cutting the posterior roots in the monkey, produced paralysis of the limbs.

The section devoted to microscopic comparative anatomy is worthy of careful study. This is a field which has not been thoroughly tilled. From the study of the lower forms much has been revealed in the higher. In many of the lower vertebrates the spinal cord is very large and is more independent of the higher centres than in man. The cranial nerves also may be enormous; we refer to Edinger's Figure 38 as an illustration of this fact. Special portions of the central nervous system have developed to a high degree in certain animals as need has arisen, and it is precisely this fact which renders the study of the lower vertebrates valuable. Parts which are atrophied or imperfect in man are seen in great perfection in some of the lower forms, as, for example, the olfactory centres or the optic lobes. The nucleus of the vagus in the fish forms a lobe, probably because this nerve is distributed to the external surface of the body like any sensory spinal nerve. The nuclei of the trigeminus and acusticus are also of large size. The oblongata is the vital portion in the lower vertebrates, for removal of all nervous tissue anterior or posterior to this does not cause death, although destruction of the oblongata itself is fatal. The cranial nerves in the vertebrates have an astonishing regularity in the arrangement of their nuclei, but the fibres which arise from these are differently combined, and afford even yet a subject of much study for the anatomist. The vermis attains a great development in those animals which are remarkable for their powers of swimming or flying, and it is probable that the cerebellum is concerned with the preservation of equilibrium and of the muscular tonus. The histology of the cerebellum is nearly the same in all animals. The small size of this organ in creeping animals indicates that it has some connection with locomotion. The lower olives have been found only in the mammalia as distinct bodies in connection with cerebellar fibres.

The third section of the book embraces most of what has formed the bulk of former editions. Edinger tells us that the degree of development of the brain as a whole is not an index of the intelligence of the individual. A man is prominent on account of the abnormal development of some one quality, and such a peculiarity may well be associated with greater development of a corresponding portion of the brain, while the entire mass may not be greater than in less highly favored individuals. A curious observation has been made by Perls and confirmed

by Edinger. Hydrocephalus of moderate degree, which has developed early in youth and not progressed, and rhachitis seem to favor the growth of the brain by lessening the resistance. There were distinct evidences of rhachitis in Rubinstein's cranium, and Cuvier, who had a very heavy brain, had had hydrocephalus in his youth. It does not follow that all men who have become prominent on account of mental qualities have been hydrocephalic, and that hydrocephalus in every case is productive of genius.

It is well to remember the statement which Edinger repeats, namely, that irritation of any part of the cerebral cortex may cause epileptic convulsions.

The writer admits the existence of the fronto-occipital tract connecting the occipital with the frontal lobe, as described by Dejerine, Rietz, and v. Monakow. He modifies his former statements in regard to the fibres surrounding the ventricles. The callosal fibres envelop the posterior horn as the forceps major; the forceps minor is that portion of these fibres which is situated on the outer side of the inferior horn and passes to the temporal lobe. The median side of the posterior and inferior horns contains the tapetum, which is not an essential part of the callosum, but probably the caudal end of the fronto-occipital bundle. It is not impossible that callosal fibres are mingled with those of the tapetum.

Although Edinger adopts the modern view in regard to the termination of the median fillet within the thalamus, he does not make clear the relation of this to the *Haubenstrahlung* (tegmental radiation). In one place he says this bundle ends in the thalamus, while in another portion of the book he states, in accordance with his former teaching, that the tegmental radiation passes toward the cord.

The "silent areas" of the brain are the associative centres (*Flehsig*). Fibres of the corona radiata do not arise in all portions of the cerebral cortex.

Edinger still speaks of the occipito-temporo-pontine tract, although in describing the crusta he refers to the temporo-pontine tract, making no mention of its occipital origin.

Pain following apoplexy, as has been shown by the writer in two cases, may be due to irritation of the sensory tract.

More attention is paid to the cerebellar peduncles than in former editions, and we are told that the anterior peduncles are indirectly connected with the parietal lobes.

We cannot share Edinger's opinion when he says so positively that tactile fibres are not found within the posterior columns. The case of syringomyelia reported by Dercum and Spiller must be explained, if this statement of Edinger is correct. Destruction of one posterior horn throughout the cervical region with loss of thermal and partial loss of pain-sense and with preservation of tactile sense in the arm is a condition rarely seen, and one which may not be disregarded. It is well known that Charcot, Gowers, and others have located tactile fibres within the posterior columns. We turn the last page of the book with regret, looking forward with eagerness to the early appearance of a sixth edition.

W. G. S.

MANUAL OF MIDWIFERY FOR THE USE OF STUDENTS AND PRACTITIONERS. By W. E. FOTHERGILL, M.A., B.S.C., M.B., C.M. With double colored plate and sixty-nine illustrations in the text. Pp. 484. New York and London: Macmillan & Co., 1896.

THIS manual is one of the productions of the Edinburgh school of obstetrics. Its author is a prize scholar of the University of Edinburgh, and recently House Physician to the Simpson Memorial Hospital. The work of Hart, Webster, Murray, and Barbour has been utilized in the preparation of this book; it is, then, a representative manual of one of the first schools of obstetric science.

The book opens with a description of the reproductive organs and of their functions. The development of the ovisac is given in accordance with Foulis's teaching, which traces the origin of the *membrana granulosa* to the connective-tissue corpuscle of the ovarian stroma. Fertilization is supposed to occur in both the tube and the uterus. The older and accepted views as to the most frequent time of conception are given. It is held that menstruation can occur only during the first two months of pregnancy, before the fusion of the decidual membranes renders this impossible. The diagnostic signs of pregnancy, the differences between primigravidae and multigravidae, and the differential diagnosis of pregnancy are clearly stated, and made more impressive by tabulated comparison. A double-page plate of colored illustrations, showing the growth of the early ovum, is also given. Our knowledge concerning the manner in which the ovum obtains nourishment is summarized for the three different periods of development through which the ovum progressively passes. The *liquor amnii* is said to be derived from the maternal blood through both the maternal and foetal vessels. The spirals of the umbilical cord are thought to be due to the tendency to spiral growth seen in animal and vegetable organisms. Under the title of a "Simple View of the Placenta," the after-birth and cord are held to be composed of the same elements—bloodvessels, low connective tissue, and foetal epithelium. It is stated that the foetal portion of the placenta is simply the flattened and branched termination of the cord.

In treating of the foetus attention is called to the fact that the principal excretion of urea is performed by the placenta, which should be recalled to mind in studying certain affections of the mother. In twin pregnancy binovular twins result from the development of two ova and are physiological. Each foetus has a distinct amnion and placenta, the sex of the children being usually different. Uniovular twins are considered pathological, resulting from the development of a single ovum, and are frequently the subject of malformation. The duration of gestation is thought to vary with the length of the menstrual cycle, and so great is the variation in pregnancy that it is considered useless to spend much trouble in calculating the probable date of labor. In estimating the length of the foetus, it is thought to be practically the same as the distance from the fundus of the uterus to the pubis. In attempting to assign a cause for the occurrence of labor recourse is had to the principle of natural selection. Heredity has gradually brought about the establishment of habitual gestation at ten menstrual cycles, which thus becomes typical of the human race. The hygiene of pregnancy

is not fully considered, and no further attention is paid to the examination of the urine than to advise that it should be tested for albumin during the later months. The pathology of pregnancy is treated at length, and in the treatment of syphilis importance is ascribed to keeping the blood alkaline by giving potassium chlorate to the end of pregnancy. Nausea and vomiting of pregnancy are briefly considered, and without especial reference to the importance of displacement of the uterus or the value of dilatation of the cervix. Albuminuria is not considered the cause of eclampsia, but albuminuria results from the diseases which in some cases produce eclamptic seizures. The examination of the urine seems to have been for albumin only, without reference to the estimation of solids or urea.

Extra-uterine pregnancy is considered in accordance with the views of Webster and Hart, and treatment is limited to surgical interference. In treating of abortion the value of the tampon is recognized, and the importance of thorough emptying of the uterus is enjoined. The douche curette is mentioned only in a foot-note.

Labors are classified as "natural," "preternatural," and "complicated," a distinction which is not evident. The mechanism of labor is carefully given, the old nomenclature of four positions for each presentation being retained. Rotation of the presenting part results from the action of the posterior segment of the pelvic floor. An interesting section on the "Anatomy of Labor" embraces illustrations, from various sources, of frozen sections. The illustrations are well selected and of value. In discussing the separation of the placenta but little weight is given to the formation of a blood-clot between the placenta and the wall of the womb. The after-birth is thought to be separated by loosening of the placental site, and to be expelled from the patient's body by detrusion.

In speaking of the management of normal labor it is not considered necessary to measure the pelvis of every patient, but only those not obviously well-grown and of pelvic conformation. This seems scarcely in keeping with the thoroughness of other portions of the book. Turpentine is recommended as an antiseptic for cleaning the hands, advice which seems hardly needful in view of the success of the bichloride method or the permanganate and oxalic acid.

No preliminary douche is required for the healthy patient, but the practice of strict cleanliness is enjoined. During the second stage of labor the rupture of the membranes is justifiable to hasten birth, a recommendation which seems scarcely adapted to all cases. Posterior rotation of the occiput is best treated by maintaining flexion and allowing the labor, if possible, to terminate spontaneously. Attention is called to the fact that extending the legs relaxes the skin and fascia of the perineum, and thus tends to lessen the danger of laceration. Immediate repair of the perineum may be made while the placenta is still within the uterus, before the third stage of labor has taken place. Ergot should not be given after labor as a routine prescription. It is advised, however, where tendency to hemorrhage is present. If the conduct of labor has been clean, it is better, on the whole, to omit all douching after delivery.

It is not thought that chloroform can be proved to increase the tendency to post-partum bleeding. In giving this anæsthetic the respiration and pupils should be carefully watched. The pulse may be neglected, if this is done. After delivery the direction is to apply a warm diaper

and the binder. It is not stated that the diaper is antiseptic, and the impressiou is given that an antiseptic dressing over the vulva is not unnecessary after labor.

Under the head of "Morbid Labor" are included defective pains, abuormal conditions of the genital tract, and abnormalities in the fœtus. Contracted pelves are embraced in this section, and the value of Walcher's position is emphasized, with the use of forceps. Symphysiotomy may succeed with a conjugate of two and one-half inches. From our experience we should not like to rely upon symphysiotomy in this degree of pelvic contraction. In generally contracted pelvis the obstetrician is warned against delivery by breech presentation. Under the head of "Preternatural Labor" are included pelvic presentations, transverse presentatiouns, and those of the hands aud feet and head and foot. The exact meaning of the term "preternatural" in this connection is not apparent in this book.

Complex labor is that complicated by hemorrhage from placenta prævia, separation of the placenta, or retained and adherent placenta.

Where there is little dilatation of the cervix and accidental hemorrhage is present, abdominal section is considered the only proper treatment. We presume that the author would perform hysterectomy, securing the vessels by ligature in such a case. The treatment of post-partum hemorrhage and especially the value of hot douches are clearly given. The author has not escaped the belief of his countrymen that iron may be used as a styptic within the uterus. He considers, however, such treatment to be rare. It should be entirely abandoned as irrational and dangerous. The value of saline transfusion is fully recognized.

In considering rupture of the perineum episiotomy is advised as a preventive, and suture with chromicized catgut, the stitches not passing through the skin, is thought the best method of repair.

Various forms of eclampsia are described, and toxæmia is hinted at as the cause, although this is not definitely stated. Chloroform, morphine, venesection, pilocarpin, and the steam-bath are advised. In cases commencing before labor the uterus should be emptied at once.

The term "apncea neonatorum" replaces asphyxia neonatorum. The reason of this variation in nomenclature is not apparent. The various methods most successfully used in this condition are given.

In dealing with obstetric operations preference is given to extraction by the forceps, and this operation is described in minute detail. Axis-traction instruments only should be used. When the head is brought upon the pelvic floor it should be entirely delivered by the traction-rods, and not by relinquishing these and grasping the handles of the forceps. It is claimed that a far more successful and skilful delivery is thus effected. The forceps is indicated in flat pelves in place of version, even though the blades must be applied over the face and occiput. Walcher's position is again recommended, and wisely so, the legs of the patient being let down while the head is at the brim of the pelvis, then raised wheu it reaches the outlet and lowered again when the head is upon the perineum. An excellent illustration of a patient in this position, taken from a photograph, is appended. Delivery by forceps is illustrated with the patient in the lateral position, although it is stated that the lithotomy position has many advantages. Symphysiotomy is briefly mentioned, and its range is stated as probably in pelves with true conjugate between two and one-half and three and one-quarter inches. We doubt its value



below eight cm., or three and one-eighth inches, in true conjugate. The after-treatment of symphysiotomy is dismissed with a couple of sentences. In treating of induced labor the operation should be rapidly completed by the use of Barnes's and de Ribes's bags. If necessary, Hegar's dilators should begin the labor. The child should be incubated.

In treating of the Cæsarean operation Sanger's is preferred. The author evidently is not familiar with the intrapelvic treatment of the stump after hysterectomy for impossible labor, for he writes that a great advance will have been made if it is found, after a sufficient number of experiments, that the stump may safely be dropped back into the peritoneal cavity as after ordinary abdominal hysterectomy.

In treating of the puerperal state no mention is made of antiseptic precautions in the care of the breasts. The nipples must be kept dry when not in use, but the necessity for avoiding septic infection is not made apparent. The patient may leave her bed in ten days and lie upon a couch, and the use of antiseptic douches may be permitted if the nurse secures perfect cleanliness of instruments and vessels.

Puerperal septicæmia is briefly considered, and we are surprised to notice that details of treatment for this affection are considered of so little importance that they are printed in foot-notes. It is considered dangerous to scrape the endometrium and apply strong solutions of phenol or corrosive sublimate, and total hysterectomy is given as a course which is now securing favorable results. It is certainly true that scraping the interior of the puerperal uterus and applying strong antiseptics is a most dangerous practice, but there are other and better methods of cleansing the cavity of the uterus which render hysterectomy advisable in rare cases only.

The care of the infant is concisely stated, but infant-feeding is very imperfectly described, and it is stated that milk may be exposed to a high temperature from thirty to forty minutes to advantage. The value of Pasteurization does not seem to be appreciated by the author.

This manual, however, is well worthy of the brilliant school of obstetrics whose teaching it embodies. In many respects it is a most admirable book, containing a great amount of modern scientific information, clearly, concisely, and logically stated. While we may differ with the author in some points, we have enjoyed and admired his manual and can heartily commend it to others.

E. P. D.

SHORT CONTRIBUTIONS TO AURAL SURGERY. By SIR WILLIAM B. DALBY, F.R.C.S., M.B. (Cantab.), Consulting Aural Surgeon to St. George's Hospital, London. Third edition. London: J. & A. Churchill, 1896.

THIS brochure consists of articles on various otological subjects that have appeared in the *Lancet* and *British Medical Journal* between 1875 and 1896. All are good; all are very conservative. It will repay any physician, whether interested in a general or special practice, to read these nineteen essays, as they are clearly written and entirely free from technical wording. We cannot single out any one or two articles as especially good, for fear of detracting from others. We can advise most heartily a careful reading of them all. The entire set are embraced in 140 well-leaded, large-typed octavo pages.

C. H. B.

# PROGRESS OF MEDICAL SCIENCE.

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## THERAPEUTICS.

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UNDER THE CHARGE OF

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**Intestinal Antisepsis.**—DR. HEINRICH STEIN closes a scholarly paper with an enumeration of the various agents by which intestinal antisepsis can be obtained. The first remedy for evacuating the intestinal contents to be mentioned is calomel, which is, by interaction with sodium chloride, converted into corrosive sublimate. For this purpose small and repeatedly frequent doses are recommended. In abnormal acidity precipitated calcium carbonate (one grain for a dose, two and one-half drachms per day) or magnesia (ninety grains per day) has an antiseptic action. Creosote, one or two drops several times daily; guaiacol, one and one-half grains for a dose; and resorcin in 5 per cent. solution in water or brandy, forty-five[?] grains daily, are useful. These are only slightly absorbed, and in that respect their action is shorter; but, on the other hand, they may act after absorption on distant areas, so that both facts should be borne in mind in prescribing. Valuable antiseptics are menthol (one and one-half grains twice or thrice daily); naphthalin (one and one-half to seven and one-half grains for a dose; seventy-five grains per day); and, finally, thymol (one and one-half grains several times daily in alcoholic solution); the last is an excellent antiparasitic (anchoylostomum). Since absorption limits the action of the drug in the intestine, various antiseptics have been prescribed with insoluble substances; salol (to two drachms per day); parachlorsalol, kresolsalol, beta-naphtholsalol or betol (the last slightly poisonous). These are broken up in the intestine, partly by the pancreatic juice and partly by the unformed intestinal ferments, into salicylic acid and kresol or naphtol. Harmless and otherwise proper substances to be used for similar purposes are benzonaphtol, ammonium sulpho-ichthyolate (to thirty grains daily), and salophen (to two drachms per day); also the esters of guaiacol. These last are first decomposed in the intestine and may give rise to a successive antiseptic action. Guaiacol benzoate—salicylate, cinnamate, carbonate (one to two grains for a dose, several times repeated). The absolutely insoluble antimicrobial remedies can be

given in much larger doses; such are phenol-bismuth (fifteen to forty-five grains per day for this and the rest); kresol-bismuth, chlorophenol-bismuth, bismuth salicylate, zinc salicylate, and trioxymethylen (paraformaldehyd). Doubtless the most effective treatment of affections of the large intestine, especially of the bacterial, is by way of the rectum. Naturally the possibility of ulceration of the intestinal wall must be considered. For irrigation, solutions in sterilized water of salicylic acid (one to two parts *per mille*); silver nitrate (0.2 to 0.5 *per mille*); boric acid (0.5 per cent.); creolin (0.01 to 0.02 per cent.); and tannin (2 to 5 per cent.) may be used. Applications of an insoluble antiseptic powder, as the various bismuth-preparations, may be used during the irrigations. The results of antiseptic intestinal medication are satisfactory, but on account of the difficulties not altogether thorough. These, however, are common to all internal antiseptics.—*Centralblatt für die Gesamte Therapie*, 1896, Heft vi. S. 321.

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**A Case of Electric Shock.**—DR. JOHN T. GILBRIDE reports an instance of recovery from a shock of two thousand volts. Twenty minutes after the accident the patient was unconscious, suffering from cerebrospinal convulsions, with legs and arms flexed, considerable jactitation, reflexes markedly increased, skin warm and dry, breathing accelerated, pulse one hundred and forty per minute, and pupils normal. Twenty grains of chloral were given by the mouth and repeated every ten minutes with but little effect until sixty grains had been taken. The convulsions almost disappeared, and he rested more quietly. One fluidounce of whiskey was now given as a heart-stimulant. The axillary temperature was 97.4° F., the respiration 20, and the pulse 100 per minute, full and strong. After twenty minutes he showed considerable violence and had a number of convulsions. After twenty grains of chloral he rested quietly and was in good condition, regaining consciousness five hours later. He now complained of being weak, of hoarseness and stiffness of the muscles, and of considerable headache. He had no recollection of occurrences for six hours before the accident. There was no vomiting nor involuntary discharges, and the only lesions were a burn of the third degree from contact with the wire and two abrasions of the scalp.—*University Medical Magazine*, 1896, No. 9, p. 724.

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**The Treatment of Syphilis and Gonorrhœa.**—DR. J. F. LARRIEN presents the second edition of his pamphlet of forty-three pages. He uses Vienna paste for the initial lesion and makes daily mercurial inunctions over the enlarged glands. For internal medication three to five drops of tincture of iodine in a half-glass of sweetened water are given each morning for twenty days while fasting. After ten days of rest this course may be repeated. For the secondary manifestations: (1) Each morning the patient receives fifteen minutes before breakfast in pure or sweetened water three drops of tincture of iodine and a half-ounce of a solution of crystallized sodium iodide in distilled water (one to fifteen), and this is to be continued during five to eight months from fifteen to twenty days each month, the remaining days being free from medication. The treatment is to be discontinued only when two months have elapsed since the appearance of all secondary manifestations. In severe cases it will be well to prescribe a

new series of three or four courses of iodine for from two to six months after the first. (2) Each day gentle inunction is made on the cutaneous syphilides with a 10 per cent. solution of white precipitate in starch glycerite. (3) For *plaques muqueuses* of the bucco-pharynx gargles of zinc chloride in water (one to five hundred) are used; or cauterization may be effected by silver nitrate or acid mercuric nitrate. In place of these may be used a gargle five to eight times daily of equal parts of hot water containing resorcin, 4 to 8; and glycerin, 50, in distilled water, 200. Of course, the usual hygienic rules must be followed.

The author also presents a method of treating gonorrhœa. At the outset there should be the ordinarily enforced avoidance of stimulating foods and beverages, replacing alcoholic drinks with Vichy, Selters, or pure water, with possible addition of a very small quantity of wine. Injections are ordered, warm, of glycerin which has been saturated when hot with boric acid (about 20 per cent.), with addition of cocaine hydrochlorate, morphine hydrochlorate, or laudanum, if there is pain, in the proportion of 0.5 to 2, 1 to 3, or 2 to 5 (according to the substance employed) to 200 parts of the vehicle. The best substance for relieving pain and reducing congestion is the cocaine. The injections are made after urination, from two to five times daily. Patients of the herpetic diathesis and those suffering from rebellious digestive disturbances receive respectively five drops of Fowler's solution every morning while fasting and five grains of salol in capsules or in hot soup at the two principal meals. During the acute stage these injections are continued, and in addition six capsules of eucalyptol or turpentine are given with each meal. During the decline of the disease the foregoing treatment is continued, and in addition Fowler's solution is added if there is tendency to chronicity or exacerbations.—Paris, 1896.

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**Vegetable Dyspepsia.**—DR. W. A. WALKER notes that vegetable foods have a tendency to fermentation when the salivary ferments are deficient in quality or quantity, and this gives rise to flatulence, heartburn, eructations, and other disagreeable symptoms, to say nothing of resultant irritations which lead to permanent impairment of the mucous coats of the stomach and intestine. This condition—dyspepsia—leads to a state of mental depression highly favorable to the production of various forms of neurotic disease. For this indigestion we have an infallible remedy in diastase. This has not been received with deserved favor, because of the prevalence of the theory, now controverted by facts, that this is destroyed soon after reaching the stomach. At least thirty minutes after the completion of the ordinary meal elapse before gastric acidity reaches such a point that diastatic digestion ceases. Bread, oatmeal, or mush can be made more digestible by the addition of about five grains of diastase to the pound of food. Since the salivary and pancreatic fluids are deficient in children, we have a valuable remedy for them in diastase. Because this drug digests starches it is a fat-producer. The malt-extracts supply only a limited and uncertain amount of diastase, hence we must look to the new isolated diastase known as *taka*-diastase to meet this indication. For amylaceous dyspepsia the following rules should be observed: (1) Omit from the dietary, so far as practicable, pastry, condiments, syrups, and sugars. (2) Chew the food, especially bread and vegetables, slowly and thoroughly.

(3) Take two and one-half grains of taka-diastase immediately after eating. (4) Avoid any habit which causes the saliva to be expectorated instead of swallowed for at least one hour after eating. (8) Correct any temporary excess of acidity in the stomach by a dose of sodium bicarbonate.—*Therapeutie Gazette*, 1896, No. 9, p. 593.

[Of quite as much importance is the formation of the habit of masticating starchy foods in as dry a condition as is possible. The sensation of thirst can be obviated by taking a pint of hot water one hour before the meal.—R. W. W.]

**The Treatment of Tuberculous Peritonitis.**—DR. THOMAS believes that the fibrous and ulcerative forms of this disease do not yield to operative measures. In young subjects a good diet aided by tonics, mild and repeated counter-irritation over the abdomen, and a coating of iodoform-collodion may result in cure. In three reported cases he obtained complete cures through the use of a creosote clyster. Seven drops of this drug, increased to double the amount, are administered in five ounces of cod-liver oil. In addition, applications of ichthyol may be used. The conclusion is suggested that this treatment will yield good results when operation is not indicated nor possible.—*Journal des Praticiens*, 1896, No. 36, p. 565.

**Thyroidine.**—DR. R. LÉPINE states that this substance can be obtained: (1) by digesting the gland with an artificial gastric juice; or (2) by extracting with alcohol and a mixture of water and glycerin; or (3)—and this is the best—by extracting with a 7½ per cent. salt-solution through which carbon dioxide is passed, and after acidifying subjecting the resultant to boiling. The recent indications for the use of this remedy are based upon its marked inhibitory action upon utero-ovarian activity and its excitant action upon the mammary glands. Thus if a nursing-woman finds that her menstruation reappears and her milk becomes impoverished the administration of this substance will meet both indications.—*La Semaine Médicale*, 1896, No. 42, p. 333.

**The Treatment of Itching by Large Doses of Calcium Chloride.**—DR. THOMAS D. SAVILL administers this drug in doses of not less than twenty grains three times daily, which should be increased even to double this amount. It should be given after meals in a wineglassful of water. Should it cause thirst, and to cover the salty taste, one drachm of tincture of orange-peel and one ounce of chloroform-water, which make it really agreeable, can be added. It is not possible, as yet, to indicate precisely which cases are most suitable for this treatment, but it is worth while trying in all instances where itching is a troublesome feature. No absolute failures have been met with, although sometimes the dose has to be considerable and continued for several weeks, especially in long-standing cases.—*British Medical Journal*, 1896, No. 1864, p. 732.

**The Action of Ozone on Nutrition.**—MM. BUTTE and PEYRON have found from their experiments on animals that the inhalation of ozonized air determines an increase in the amount of elimination of total nitrogen, urica, and phosphoric acid.—*La Semaine Médicale*, 1896, No. 42, p. 338.

**The Treatment of Inoperable Local Tuberculosis.**—M. CAROMILAS has used with complete success for a patient suffering from osteitis of the pubis with double suppuration, salpingitis, and incipient pulmonary disease, all tuberculous, an injection into the foci of suppuration composed of camphor, 5; resorcin, 4; olive oil, 10; carbon disulphide, 12. This is useful in the majority of instances of inoperable local tuberculosis.—*La Presse Médicale*, 1896, No. 77, p. 488.

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**Anuria Cured by Vesical Injections.**—DR. ALBESPY reports a single instance of complete anuria of four days' duration apparently due to complete spasm of the entire urinary tract. A decoction of belladonna-leaves, 10 to 500, with 10 parts of boric acid, was injected through a metallic catheter, thus hoping to relieve the spasm of the unstriated muscle of the bladder by the well-known dilating action of belladonna when absorbed by the vesical mucous membrane. Of this injection about two ounces were left in the bladder. As a result more than ten ounces of urine were obtained, and a repetition of the injection was followed by a copious flow of urine. It is evident from this recital that there are a certain number of instances in which the anuria is due to a spasm of the tissues produced through the motor nerves, proceeding from the solar plexus. In these instances the action of belladonna will serve as a touchstone when there are difficulties in diagnosis.—*Bulletin Général de Thérapeutique*, 1896, 5e liv. p. 225.

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**The Action of Benzacetin in Neuralgia.**—DR. A. REISS has made use of the following mixture: benzacetin, 85.8; caffen, 8.5; and citric acid, 5.7 per cent., in his practice at the Insane Asylum at Stephansfeld. In old cases of habitual headaches, neuralgia, and migraine the action was satisfactory. Improvement followed in from one-quarter to three hours and persisted from one to two days. Unpleasant circulatory and digestive symptoms were observed in only two instances. The usual dose was eighteen grains. If one dose was not sufficient, the second was given in from one-half to one hour. Of sixty-one patients eighteen were completely cured, twenty improved, with questionable results in five, and none in eighteen.—*Therapeutische Monatshefte*, 1896, Heft 6, S. 319.

[Benzacetin is said to be acetamido-methyl-salicylic acid, which is soluble in alcohol and slightly in water.—R. W. W.]

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**The Treatment of Erysipelas with Vaseline.**—DR. H. KÖSTER states that this consists in painting the parts affected twice daily, covering the application with linen and fastening with a gauze bandage. Beyond this the treatment is purely symptomatic; for headache, acetanilid or antipyrin; if the temperature is over 104° F., quinine in seven-grain doses; if cerebral symptoms, ice-bag to the head, a cathartic, as calomel or senna; for delirium, chloral; for heart-weakness, digitalis and alcohol. The advantages of this method are obvious. The one hundred and thirty patients show that the results are equally as good as with other methods. (1) The duration of the fever is the same as with lead-lotion, painting with iodine, ichthyol-vaselin, or sublimate-lanolin. (2) This treatment results in extension of the process as frequently as do the others, for none is exempt. (3) Complications,

especially of phlegmonous processes, are not more frequent than under other methods. (4) This method is equally efficient, and presents no danger of exciting untoward symptoms, as burning, odor, or poisoning, and the additional advantage that it is inexpensive.—*Therapeutische Monatshefte*, 1896, Heft 6, S. 299.

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**Uranium Nitrate.**—DR. SAMUEL WEST reports that, when administered in the treatment of diabetes mellitus, this drug diminishes thirst, reduces the amount of urine which is passed, and reduces the percentage of sugar. Ten grains can be administered three times daily without inconvenience as far as concerns digestion. He concludes that it is a drug of considerable value, though, like other drugs, it cannot be relied upon to produce equally good results in all cases indiscriminately.—*Medical Press and Circular*, 1896, No. 2989, p. 127.

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**The Treatment of Incontinence of Urine by Suggestion.**—DR. A. CULLERRE has treated twenty-four patients, infants and children, during the past four years. Of these hypnotic suggestion has cured twenty, benefited two, and in two instances only has there been failure to obtain permanent relief. The degree of hypnotism is not of great importance. The formula of suggestion varies according to the case: not to wet the bed; to awaken the moment the desire is felt; to awaken at a given hour to urinate; to think while sleeping that it is not necessary to wet the bed. If necessary, there can be provoked an insomnia intended to accustom the brain to perceive the need of urination. Soon this insomnia disappears of itself, and the patient, accustomed to watch his bladder, does it even although sleeping. Generally the cure is immediate; sometimes it is delayed for several weeks. The age of the patients treated was from six to twenty-three years; the method is applicable above the age of three years. The author believes that essential incontinence of urine in infants and adolescents is a neuropathic stigma, in general benign, but sometimes a forerunner of more or less grave nervous affections, as neurasthenia, hysteria, hypochondriasis, mental obsessions, being founded upon preoccupation or fixed ideas relative to the urinary function. The patients come from families in which the neuropathic stigmata are of different forms, not necessarily mental alienation, properly speaking, but often signs of physical and moral degeneration. Incontinence is transmissible by similar heredity; it may even become a family disease.—*Archives de Neurologie*, 1896, No. 7, p. 1.

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**Creosote Valerianate.**—DR. E. GRAWITZ uses this remedy in gelatin capsules, which conceal the taste and odor of the drug. In each capsule three drops are placed, and one of these is given thrice daily with milk. The dose can be increased to thirty drops daily. The results of its use with thirty-five tuberculous patients shows that it is an advantageous method of prescribing creosote.—*Therapeutische Monatshefte*, 1896, Heft 7, S. 384.

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**The Influence of Somatose upon the Milk of Nursing-women.**—DR. RICHARD DREWS states that this food exercises a specific action upon the mammary glands of nursing-women in that it produces an abundant

secretion of milk and rapidly removes the disorders observed during lactation. It is, therefore, recommended when the quantity is insufficient and when at the commencement of lactation the flow seems about to cease, in order that the dangers of artificial alimentation may be avoided. It goes without saying that the integrity of the gland is perfect and there are present no diseases which prevent nursing. The dose is three or four teaspoonfuls daily taken in milk, hot bouillon, or cocoa. It has hardly any taste, and therefore is easily administered and its use continued for a long time.—*Revue de Thérapeutique Médico-Chirurgicale*, 1896, No. 13, p. 392.

**The Treatment of Whooping-cough.**—DR. FERREIRA reports twelve instances of the use of bromoform, and concludes that (1) in case of failure of topical applications or when they are not possible we must resort to general therapeutic measures. (2) The preparations of belladonna in intensive doses, and especially of atropine, exercise a real influence upon the cough. The difficulty of managing the remedies and their incontestable dangers prevent their popular use. (3) Bromoform, if it does not surpass, can be placed equal with belladonna and atropine for this purpose. It acts promptly and diminishes the attacks and produces amelioration and indeed cure when used with energy and in accord with the severity of the disease. (4) The drug is of easy administration in infancy, and children bear the remedy remarkably well. (5) Through its double action (sedative and antiseptic) it fulfils two indications in combating the spasmodic element and attacking the germs causing the disease. (6) It should be used *larga manu* in view of the excellent results obtained. The drug is given in solution, with sufficient alcohol for dissolving it, in dose of from three to six drops daily for children under one year, and six to fifteen drops for larger children.—*Bulletin Général de Thérapeutique*, 1896, 12e liv., p. 529.

**The Preparations of Strophanthus.**—DRS. HORATIO C. WOOD and WILLIAM S. CARTER have made a laboratory study of both an extract of the drug as well as of strophanthin. They found that the extract was an active preparation, having but little action upon the vasomotor centres, as compared with what it has upon the heart and vessel-walls. Experiments with commercial strophanthin showed that this also is an active substance, more markedly raising the arterial pressure than did the extract, thus confirming the conclusion of Rothzigel and Koralzewski that the former is a superior preparation of the drug.—*American Journal of Pharmacy*, 1896, No. 7, p. 353.

**Senecio (Groundsel).**—DRS. DALCHÉ and HEIM report their clinical observations upon the use of a dry extract of *Senecio vulgaris* in pill-form, six grains each, to the number of eight or ten daily. It seems to calm menstrual pain so long as the genital organs are healthy; but when there is uterine or periuterine disease it is without effect. This limits its employment to such conditions as the dysmenorrhœa of chloro-anæmics, of nervous hysterics or neurasthenics, of young girls, whose menstrual pains of long duration appear to be due to painful or defective ovulation. Beyond its influence upon pain it is an open question whether it affects the appearance of menstruation, favoring the establishment of the menstrual flow. It fails



in the presence of various uterine and periuterine difficulties as well as in the painful symptoms of the intermenstrual period.—*Les Nouveaux Remèdes*, 1896, No. 14, p. 409.

**The Treatment of Dog-bites.**—DR. J. C. VAUGHAN recommends the immediate treatment with strong fuming nitric or hydrochloric acid. One or two drops will suffice, and the slough soon separates leaving a clean wound, which heals readily. The silver nitrate stick is objectionable in that when pushed into the wound it practically repeats the bite, driving the deeper-lying saliva deeper into the tissues and further outside, and hence better protected by the albumin coagulum-film formed in the wound by this treatment.—*Indian Medical Gazette*, 1896, No. 8, p. 273.

**Morphine Chloride in Poisoning by Potassium Cyanide.**—DR. L. HEIM, in his experiments upon mice, found that subcutaneous injections of morphine chloride after fatal doses of potassium cyanide saved six out of ten experimented upon. The explanation is probably that in the presence of the iron in the alkaline blood these two substances are, by chemical interchange, transformed into oxydimorphine and Berlin-blue, both of which are relatively non-poisonous.—*Münchener medicinische Wochenschrift*, 1896, No. 37, S. 861.

**The Contraindications to the Bromides.**—DR. S. STERLING sounds a note of warning to the indiscriminate and prolonged use of the bromides by anæmic individuals. So also in respiratory catarrhs, which they are likely to aggravate, caution should be exercised. In gastric and intestinal diseases the loss of appetite, burning or pressure in the stomach, nausea, vomiting, and diarrhœa are symptoms, caused by large doses, which should not be ignored. When cutaneous irritation or hyperæsthesia is present the irritant effects of the bromides may contraindicate their use. A consideration of these facts should lead to more care in the prescribing of these salts.—*Therapeutische Monatshefte*, 1896, Heft 9, S. 500.

**Absolute Alcohol as Disinfectant for Instruments.**—DR. ROBERT L. RANDOLPH, after laboratory experimentation, has reached the following conclusions: (1) that in a great number of eye-instruments by far the majority are infected by exposure to the air; (2) that absolute alcohol would seem to be a valuable disinfectant for instruments infected under the conditions which ordinarily surround us in everyday life; (3) that the septic character of instruments infected with a pure culture of staphylococcus albus is not altered by exposure for twenty minutes to the action of absolute alcohol. The alcohol used is supposed to have a strength varying from 98½ to 99½ per cent.—*Johns Hopkins Hospital Bulletin*, 1896, Nos. 66 and 67, p. 185.

**The "Disintoxication" of the Blood in Cerebral Rheumatism.**—DR. H. BARRÉ reports a single instance in which in spite of repeated cold baths and sodium salicylate the temperature rapidly rose. The method is as follows: first, the needle through which the artificial serum is to be passed is introduced into the right median cephalic vein. As the transfusion is

beginning to be made, another needle, through which the blood is to be withdrawn, is introduced into the corresponding vein of the other arm. Improvement showed itself when about six ounces of blood, which had been replaced by the artificial serum, had been withdrawn. Twenty ounces in all were withdrawn. The patient recovered. The essential peculiarity of the process consists in the simultaneous drawing of blood and introduction of artificial serum in quantity not greater than that of the blood withdrawn.—*Medical Press and Circular*, 1896, No. 10, p. 230.

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**The Treatment of Rheumatism by Local Application of Methyl Salicylate.**—MM. LANNOIS and LINOSSIER have found that this method will advantageously replace the use of salicylates when given by the mouth, but should only be thus used when they are impossible to be administered, the reason being the difficulty of applying the drug to very painful joints. In the sub-acute and chronic forms it is useful, and its absorption is equally certain.—*La Semaine Médicale*, 1896, No. 42, p. 388.

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**The Treatment of Cardiac Failure.**—DR. T. GRAINGER STEWART believes that the most important agent is rest, next the element of hope, and finally diet. Here excess of fluids is to be guarded against. Alcohol as an article of diet must not be used, even to habitual slight excess, nor in any form which gives rise to dyspepsia. Massage in the great majority of cases of cardiac dilatation diminishes the area of cardiac dulness. The character of the cardiac sounds and the rhythm and strength of the pulse correspondingly improve, the patients usually experience a sensation of comfort and feel the better for the treatment, although rarely the opposite effect may be produced. Although the immediate effects pass off in a few hours, they frequently do not pass off completely. Repeated applications bring about a permanent diminution of the area of dulness, with improvement of the pulse and patient's sensations, although the effect rarely may be deleterious. Movements with limited resistance show in a large proportion of cases immediate improvement in the condition of the heart, as shown by percussion and auscultation, the sounds becoming more distinct and the area of dulness diminishing to a greater or less extent. In many cases the rhythm of the pulse improves and the heart becomes more vigorous. While the immediate effect is in so far temporary, the heart rarely goes back to its previous condition of dilatation, but remains somewhat smaller than it was before the exercises, and gradual improvement of a lasting kind sets in, so that the heart recovers its tone and the area of dulness diminishes. The saline bath (five pounds of sodium chloride with eight ounces of calcium chloride in a forty-gallon bath), in which carbon dioxide in large quantities is liberated, produces a most striking diminution of the area of cardiac dulness, with slowing and strengthening of the pulse, changes just as definite as those produced by the exercises above mentioned.—*British Medical Journal*, 1896, No. 1864, p. 701.

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**A Modified Method of Administering Oxygen and Ether.**—DR. H. A. HARE states that when oxygen is given with ether vomiting is less frequently met with, excessive pallor is rarely seen, and post-operative

depression seems to be largely avoided. The apparatus which he suggests consists of a somewhat funnel-shaped piece of leather having a greater diameter in one direction than in another, into which is fitted a piece of soft felt or spongiopiline almost a quarter of an inch thick. In the under surface of the leather cone is inserted a small metal tube, and at the opening of this tube a small hole is cut in the spongiopiline. The ether is poured upon the spongiopiline in the cone, in the apex of which is placed some absorbent cotton. The oxygen enters the cone by means of a rubber tube attached to the above-mentioned metal entrance. With this apparatus (1) the supply of oxygen can be delivered in varying quantities without altering the amount of the anæsthetic; (2) any quantity of anæsthetic can be employed without necessarily increasing the oxygen; (3) the leather cone prevents the rapid evaporation of the ether; (4) the spongiopiline will retain a larger quantity of ether than an ordinary towel; (5) chloroform can be substituted for ether by removing a metal cap which can be placed on the apex of the cone, thus permitting fresh air to be inhaled with the anæsthetic in such quantities as may be desired.—*Therapeutic Gazette*, 1896, No. 6, p. 445.

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**Local Cocaine-anæsthesia.**—DOTT. TITO COSTA calls attention to the fact that when the injections are made with the solution at a temperature of 122° F. to 131° F. the following advantages are presented: (1) weak solutions (0.5 to 0.4 per cent.) possess a marked anæsthetic power; (2) local anæsthesia appears immediately after injection; (3) with an equal quantity of solution injected there is obtained a greater zone of anæsthetized tissue; (4) with an equal amount of cocaine more than double the amount of tissue can be anæsthetized by this method, and since the percentage of drug is lessened the toxic effects are markedly diminished. The elevated temperature is an obstacle to the absorption of the drug, thus making the injected solution more diffusible in the meshwork of the tissues and therefore increasing the anæsthetic zone.—*Pract.*, 1896, No. 26, p. 737.

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**A New Stain for the Gonococcus.**—A new combination of aniline colors is proposed by PICK and JACOBSON as a bacterial stain very well adapted to the gonococcus (*Berliner klinische Wochenschrift*, 1896, No. 36, 811). It consists of 20 c.cm. of distilled water to which 15 drops of carbolic fuchsin and 8 drops of a saturated alcoholic solution of methylene-blue have been added. Cover-glass preparations are dried and fixed in the usual way, and are immersed in the stain for from eight to ten seconds. They are then washed in water, are again dried, and mounted in balsam.

When stained by this method the cells of gonorrhœal pus have a faint reddish color, forming a good contrast-background for the intensely blue gonococci.

[As the result of a few tests of this stain it would appear that the best results are obtained when the stain is allowed somewhat longer action than the eight or ten seconds mentioned by Pick and Jacobson, but from one to two minutes is amply sufficient, and the preparations are then very handsome. It is not claimed that this is a selective stain for the gonococcus alone; simply that it is well adapted to the morphological detection of that germ.]

**Anæsthesia.**—The semi-centennial of the first public demonstration of the anæsthetic properties of ether by DR. WILLIAM THOMAS GREEN MORTON, its discoverer, has been the occasion for the presentation of a considerable number of valuable papers.

DR. FREDERIC W. HEWITT believes that it is somewhat unlikely that an anæsthetic will be found which would possess the simplicity, the agreeableness, and the potency which characterize the administration of chloroform, the safety which distinguishes ether, and the freedom from after-effects which is such an advantage in the case of nitrous oxide. Putting on one side the possibility of the discovery of some new anæsthetic or analgesic agent, there is every reason to believe that our present systems and methods are capable of considerable development and improvement. Numerous possibilities suggest themselves. A far wider range of utility may be in store for certain drugs which are known to have anæsthetic properties, but which, for some reason or other, have not come into favor. Novel successions or combinations of anæsthetics are very likely to be worked out and to prove useful. Chloroform-anæsthesia may yet be rendered as safe as that of ether. The anæsthesia of nitrous oxide in presence of oxygen may have a great future before it. Our knowledge as to the best lines of treatment for different types or subjects is rapidly on the increase. And, lastly, let us hope that we may discover means for preventing or minimizing the after-effects of ether and chloroform.—*The Practitioner*, 1896, No. 340, p. 347.

MR. GEORGE ROWELL sums up our present knowledge by stating that chloroform is a dangerous drug because of its deleterious effect upon the heart. By avoidance of air-limitation, and by carefully watching the various symptoms displayed by the patient, an overdose of chloroform should never occur. This being avoided, the risks during chloroform administration are mainly associated with imperfect degrees of anæsthesia, and the great risk of danger lies in the occurrence of asphyxia, however produced. Although with experience and care the number of chloroform-deaths is capable of considerable reduction, yet chloroform is not, in spite of its advantages, the most desirable drug for routine use in producing anæsthesia. Still, it is of great value in cases in which, from some diseased condition of the patient, or from the particular requirements of the surgeon, ether and mixtures are contra-indicated; and this, beyond doubt, is its true sphere of usefulness.—*Ibidem*, p. 357.

MR. F. WOODHOUSE BRAINE, from thirty years' experience in the administration of anæsthetics, has arrived at the conclusion that ether should rank *facile princeps* among anæsthetics, and were he limited to the employment of only one anæsthetic agent out of the number that have at various times been brought forward, he would without hesitation give the preference to ether.—*Ibidem*, p. 365.

MR. GEORGE H. BAILEY believes the cases in which ether should not be used are those in which its administration cannot be kept up, as in and about the mouth. There is no distinction in perfect anæsthetic effect between ether and chloroform, and the former, given as it should be, can be used in the same cases as chloroform. In the very young and very old ether is preferred. Most certainly the young die under chloroform, and the stimulation of ether is good for the old. Neither is used in organic disease, but then neither do

we operate under such conditions. It seems that in this fiftieth year of the use of ether it is in far greater and increasing favor than some years ago.—*Ibidem*, p. 369.

MR. MARMADUKE SHIELD pleads for better instruction in the administration of anæsthetics, and cites as remedies for the prevailing haphazard methods of practice that instruction in anæsthetics should be made compulsory and that an examination in this subject is desirable.—*Ibidem*, p. 387.

**The Treatment of Graves's Disease.**—DR. W. H. THOMSON, believing that this has its origin from gastro-intestinal ptomaine-poisoning, regards diet as of great importance; meat is as poisonous in this as saccharine food in diabetes. It is an absolute necessity that a milk-diet be kept up for two years if the patients expect to get well. It is doubtful whether the majority of adults can digest fresh milk in any quantity continuously, unless the stomach is spared the task of the initial curdling of the milk with its own juices, which is a necessary preliminary to its final digestion. The experience of the peoples whose only staple is milk seems to show that milk should be fermented before using it. If matzoon is not procurable, a domestic article can be made as follows: half an ordinary yeast-cake is broken up in a pint of slightly warmed milk, which is then put aside in the kitchen for twelve hours until it has begun to curdle. One-fourth of this fermented milk is now stirred into three times this quantity of warmed fresh milk and set aside, as before, when, in summer, at least, it will be fermented in twelve hours, and could then be used but for the bitter taste of the yeast still perceptible in it. A third specimen, made in the same proportion, from the second, will generally have only the slightly acid flavor of good matzoon. After this all that is needed is to keep enough matzoon from each day's making to ferment the next day's supply. When it is thus curdled it should be well stirred and put in a refrigerator to prevent its becoming too sour. It is well not to have it too cold when used, and it should be smooth like cream and eaten with a spoon, as is soup, rather than drunk. A moderate amount of fish, and not more than one egg daily, can be taken. Bread may be used freely. Among vegetables potatoes, corn, beans, and peas are injurious if there be any tendency to diarrhœa, which necessitates the avoidance of both vegetables and fruits. Asparagus is mischievous, and often oatmeal, while tomatoes in salad with lettuce generally agree. No pastry nor cakes, excepting gingerbread, are allowed. No coffee, tea, nor cocoa should be taken, and spirits should be used only when syneopal symptoms arise. Mercurial purgation should be used systematically once each week; a blue pill, followed by a saline, or one-third of a grain of calomel rubbed up with milk-sugar, every fifteen minutes, for six doses, and a saline administered three hours after the last dose. The chief medicinal treatment consists in the systematic and unremitting use of intestinal antiseptics. As formulas: phenol-bismuth, 10 grains, with sodium benzoate and bismuth subcarbonate, of each 5 grains, in capsules, two hours after each meal; or salol, 2½, ichthyol, 1½, and sodium benzoate and bismuth salicylate, of each 7½ grains, in capsules, two hours after each meal. These antiseptics exert a specific control over the vascular and cardiac disturbances in marked contrast to the inefficiency of cardiac sedatives, and they are apparently without any injurious effect. They affect just

as favorably other symptoms, as insomnia, tremor, and agitation. Strophanthus, in doses of from 5 to 10 drops of the tincture, may be used as an adjunct, and for nocturnal attacks of dyspnoea and palpitation 10 drops of the tincture of belladonna may be employed. In some cases of violent action of the heart 5 drops of tincture of aconite, night and morning, may be prescribed. So far as operation is concerned, there is no class of patients more unpromising for surgical interference than they are at any period of the malady.—*New York Medical Journal*, 1886, No. 932, p. 473; No. 933, p. 505.

## MEDICINE.

UNDER THE CHARGE OF

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**A Case of Carcinoma of the Thoracic Duct with Chylous Ascites.**—SCHRAMM (*Berliner klinische Wochenschrift*, October 26, 1896) reports a case of carcinoma of the thoracic duct associated with chylous ascites. As a cause of chylous ascites, carcinoma of the thoracic duct is extremely rare. Leydhecker reported the only case that has appeared in the literature. The latter, however, was able to find records of only five cases of cancer of the thoracic duct, but in none of these instances was the disease accompanied by chylous ascites. Schramm's case was the second that had come under his observation. It occurred in a woman, aged fifty-three years, who came under observation on January 2, 1896. During the summer of 1895 she gradually grew weaker and became much emaciated. Later, gastric symptoms, as loss of appetite and a sense of pressure after eating, appeared. Severe pain in the abdomen and back followed, with distention of the former, that was first noticed on December 20, 1895. When the patient came under observation there was marked abdominal distention. Physical examination showed that there were evidences of an exudate in the abdominal cavity. This apparently was encysted, as the dulness was limited chiefly to the epigastric, umbilical, and hypogastric regions, the lumbar region giving a tympanitic note on percussion. There was no movable dulness, but fluctuation was quite marked. A gynecological examination failed to clear up the diagnosis of the case. On January 15th the abdomen was opened and sixteen litres of milky, whitish-yellow fluid were removed. No definite abdominal changes could be made out, however. Two days later the patient died, and an autopsy was made. A hard, irregular tumor about the size of the fist occupied the region of the head of the pancreas. Nodules were scattered over the surface of the gall-bladder, and others were distributed

throughout the substance of the liver. The thoracic duct from the first lumbar vertebra to its termination in the left subclavian vein presented cord-like thickenings as large as one's finger. At the termination of the duct were infiltrated glands that surrounded and compressed the jugular and subclavian veins. It was impossible to determine where the primary seat of the growth was. The thoracic duct was found to be completely obliterated or thrombosed at the points where the nodules were situated. Microscopic examination of sections from the various growths showed the cells to be carcinomatous in character. Chemical and microscopic examination of the chylous fluid showed that it was of the nature of chyle, although it was not so rich in albumin and fat as normal chyle usually is. Sugar was present in very small quantity, as is usually the case in normal chyle. Owing to the obliteration of the thoracic duct at various points, and to compression of enlarged glands at its orifice, there was complete obstruction to the flow of chyle. A rupture of the duct was not to be made out at any point, and Schramm thinks that pathologic changes in the wall of the duct permitted a transudation of its contents into the peritoneal cavity. It was not possible on microscopic examination to determine definitely the primary focus, although the pancreas was considered the probable primary seat of the disease.

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**Ammonia in the Gastric Juice and in the Saliva.**—STICKER (*Münch. medicin. Wochenschr.*, October 20 and 27, 1896) investigates the source of the ammonia contained in the stomach-secretion. Rosenheim found ammonia present, in quantities varying from 0.1 to 0.5 per mille, in the gastric juice of healthy individuals in all stages of digestion and after the ingestion of various food-mixtures. Rosenheim's observation has been confirmed by others. As an easy method of demonstrating the presence of ammonia, Sticker recommends the following modification of Streng's test: to a drop of the gastric juice a drop of a 10 per cent. solution of NaOH is added on a porcelain plate. A drop of Nessler's reagent is placed on the plate in the immediate vicinity. The two drops are then covered by a watch-crystal. Ammonia is liberated from the drop of gastric juice and enters into combination with the Nessler's reagent, producing ammonio-mercuric iodide, which causes a yellow, yellowish-red to greenish-red cloudiness of the latter. Rosenheim found that the food contained only a very small amount of ammonia, and held that most of the latter found in the gastric juice was produced by the peptic glands. Sticker doubts this assertion, and claims that the ammonia in the gastric contents is derived from the saliva swallowed with the food, which he proceeds to prove.

By means of the test already mentioned, and by other tests as well, he demonstrated that the saliva practically always contains ammonia in varying percentages. It appears to be present in two forms; first, as a loosely combined compound in the form of ammonium carbonate; and, secondly, as ammonium chloride, which is a much more stable compound. The latter he finds constantly present, whilst the former is frequently absent. The loosely combined ammonia is often present in the saliva in anæmia and in febrile conditions, in both of which he has been able to demonstrate the presence of ammonia in the blood. According to the estimates of the various writers,

the amount of ammonia in the gastric juice ranges between 0.1 and 0.25 grm. per mille. Sticker, from a large number of analyses, finds that the ammonia in the saliva varies between 0.0476 and 0.27 per mille, and thus concludes that it is quite probable that the ammonia in the stomach-contents is derived from the saliva swallowed with the food. He administered special meals to a number of patients and then removed the gastric contents at varying intervals—immediately, one hour, and two hours afterward—and found that the meal removed immediately after being taken contained more ammonia than did those that were allowed to remain one or two hours. Sticker considers this strong evidence against the theory that the ammonia is produced by the peptic glands, in which instance one would expect the amount of ammonia to increase as digestion went on. In four cases the gastric contents were removed two hours after the meal was taken, and ammonia found to be present. It had previously been demonstrated to be present in the sputum. The stomach was then washed out with a 10 per cent. soda solution, and the wash-water last removed proved to be free from ammonia. He then waited fifteen minutes and removed the fluid that had been secreted in the meantime and tested it for ammonia, finding the latter absent. From these experiments Sticker concludes that ammonia is not normally produced in the stomach, but that it is derived from the saliva which is swallowed with the food.

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**Thrombosis of the Abdominal Aorta.**—BELL (*British Medical Journal*, October 24, 1896) gives an account of an interesting case of a patient who was admitted to the Lowestoft Hospital under his care, suffering from total paraplegia and intense pain in the legs and lower part of the back. On the day before admission the patient, who was thirty years of age, was walking along the street when he was suddenly seized with intense pain in the back and abdomen. His legs became suddenly powerless and he fell to the ground, but he did not lose consciousness.

An examination showed absolute paralysis of both lower extremities, with anaesthesia and analgesia of both legs extending as high up as the lower third of the thigh on both sides. There was a zone of hyperaesthesia two inches in width above the anaesthetic area. Sensation above this appeared normal. Knee-jerks, plantar and cremasteric reflexes were absent. The patient was in a condition of severe shock. There were involuntary passages of urine and feces, and control of the sphincters of the bladder and bowel was completely lost. The anaesthetic area extended upward and finally reached the trunk. Paraplegia became complete, and the lower extremities were cold and quite pulseless. On the fourth day after the illness began there was commencing gangrene of the skin of the right calf and of part of the scrotum, and the patient exhaled a strong gangrenous odor. The same day the patient died in a condition of collapse. Only an incomplete autopsy was permitted. The lumbar enlargement of the cord and the cauda equina were removed, but showed no gross lesions. The abdominal aorta was found occluded by a firm white coagulum from a point one and three-quarters of an inch above its bifurcation and extending into the common iliacs on either side, one inch into the left and seven-eighths of an inch into the right. No changes in the arterial coat could be made out. Bell thinks that the



paraplegia was due to the shutting off of the blood-supply to the cord through the three lowest lumbar arteries. These arteries go to supply the lumbar enlargement of the cord, from which arise the first, second, third, and fourth sacral nerves, and the sacral plexus, from which the great and small sciatic and pudic nerves, as well as muscular branches, originate. It is quite probable that the sudden deprivation of this portion of the cord of its blood-supply was the cause of the extensive paralysis that ensued.

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**Erythema Exudativum Multiforme of the Buccal Mucous Membrane.**—LUKASIEWICZ (*Wiener klinische Wochenschr.*, 1896, ix. 23) in November and December, 1895, observed at his Polyclinic in Innsbruck, two cases of erythema multiforme of the mouth in otherwise healthy men, and in whom the skin remained free during the whole course of the disease. The upper and lower lip, the inner surface of the cheeks, and the gums show superficial, round, or irregular areas with the loss of substance. These varied in size from a millet-seed to a pea, were of a grayish color on the surface, and bled very easily. On the soft palate there were typical vesicles and small reddish ulcerations. In two other cases, with similar lesions on the buccal mucous membrane, the affection extended to the skin and produced a typical efflorescence of erythema exudativum multiforme. Lukasiewicz thinks that the mucous membrane of the mouth may be the point of infection in such cases, if one views the disease as one of the infectious diseases which it most resembles. In cases in which the disease is limited to the buccal cavity one bases the diagnosis on the acuteness of the process, the superficial character, the peripheral spreading, and quick loss of the epithelium over the erythematous area. Pemphigus shows larger vesicles and the inflammatory process is more deeply situated and runs a more chronic course. Herpes zoster is usually one-sided and associated with severe neuralgic pain. Syphilitic papules would be distinguished by the associated infiltration.

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**Acute Alcoholic Intoxication in a Child, followed by Convulsions and Paralysis of Central Origin and by Multiple Neuritis.**—HERTER (*New York Medical Journal*, November 7, 1896) reports a case of acute alcoholic intoxication in a child, aged three and a half years, due to drinking twelve ounces of pure whiskey. The child at once fell to the floor and became unconscious, remaining in a state of stupor which lasted for more than two months. During this time he had repeated convulsions, partly general and partly limited to the left side. A right-sided paralysis, especially marked in the arm, developed. Later, extreme contractures, particularly of the left side, appeared. There was marked atrophy of the muscles of the upper and lower extremities, with loss of faradic excitability. Dilatation of the pupils, strabismus, nystagmus, and repeated vomiting were symptoms present during the first two months. For several weeks there were evidences of consolidation of the lower lobe of the right lung, during which there was irregular fever. The child did not come under observation until three weeks after the commencement of the illness, and at first the symptoms were thought likely due to a meningitis. When it was ascertained that the child had taken a large draught of whiskey, the symptoms of neuritis, which had become very marked, were referred to this cause. Herter was led to believe that the

cerebral symptoms were also of alcoholic origin. Five months after the illness began the child appeared perfectly well, with the exception of slight stammering in speaking, so that no opportunity was given of studying the anatomical lesions.

What the cerebral lesions likely were Herter is unable to state, but refers to Berkley's experiments on rabbits in which increasing doses of alcohol were administered. All animals showed marked loss of weight, and two of them died in convulsions. Sections of the brain-cortex showed that the cell-bodies of the nerve-cells stained imperfectly. There was commencing swelling of the nucleoli, as well as swelling of the branches of certain dendrons, while in other instances the dendrites were apparently atrophic.

The cell-bodies of the vascular neuroglia-cells appeared increased in size, and their protoplasmic extensions were thick and knotty. The bloodvessels showed marked changes. In the arteries and intermediary vessels the nuclei of the endothelial cells were everywhere swollen and in places fragmented. The change in the muscular protoplasm of the vessel-walls was especially distinct, and indicated that the cells were undergoing a retrogressive change. Numerous leucocytes in various stages of degeneration were present in the perivascular spaces. The changes in the nervous structures appeared to be dependent on the vascular changes. Herter thinks that alcoholic intoxication may produce similar alterations in the cerebral cortex in man.

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**On the Constant Occurrence of Anchylostomum Duodenale in Negroes, without Anæmia; and on the Fauna of the Negro Intestine.**—ZINN and JACOBY, in Gerhardt's clinic, have made some interesting observations on the intestinal parasites of twenty-three native African negroes, representing various parts of East and West Africa. The following parasites were found: anchylostomum duodenale, twenty-one times; trichoccephalus dispar, eight times; ascaris, eight times; anguillula stercoralis, four times; tæniæ, four times; amœbæ, twice. The subjects in whom anchylostomum was not found were not examined with sufficient thoroughness to disprove the title of this article. An infection after leaving Africa could be excluded. The negroes showed no sign of the anæmia so striking as a symptom in Europeans with anchylostomiasis, so that, as the authors say, the negroes have anchylostomum, but not anchylostomiasis. The difference in the cases examined could not be explained by a small number of worms, and the authors ascribe it to a racial peculiarity, such as that shown by some races toward malaria. The necessity for prophylaxis on the part of members of the Caucasian race exposed to the parasites in Africa, or from the emigration of Africans, is obvious.—*Berliner klin. Wochenschrift*, 1896, No. 36.

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**A Symptom of Fecal Tumors.**—R. GERSUNY (*Wiener klin. Wochenschrift*, 1896, No. 40) calls attention to a new symptom in certain cases of fecal tumor. It consists simply in the fact that if strong pressure be slowly made with the finger on the tumor, the mucous membrane of the intestine will adhere in the depression, and will separate from it when the pressure is slowly removed. It is this separation which is diagnostic. It is necessary for the production of the symptom that the mucous membrane of the intestine be dry and the fecal mass not too hard. It is especially important that

there be enough gas present in the intestine to cause separation of the intestine from the mass. These conditions can evidently rarely be prevented by other things than fecal tumor.

Some interesting illustrative cases are cited, showing the value of the symptom, and some suggestive remarks on chronic constipation are added.

**The Percussion of the Spleen.**—BÄUMLER calls attention to the advantage of determining the size of the spleen by percussion instead of palpation, as is almost universally done. He holds that an enlarged spleen can rarely be felt, even when there is no tympanites, whereas even moderate enlargement can be made out by percussion. Dulness in an oval figure, seven to eight by ten centimetres, according to him, indicates enlargement. In order to avoid the difficulty caused by the position of the thin spleen between organs of different degrees of resonance, it is important to percuss with different degrees of force in different parts. Bäumlér holds that even the posterior and upper parts of the spleen can be mapped out. Usually the diagonal position of the patient is most convenient, but it is sometimes necessary to try various positions. Von Ziemssen agrees in general with the opinion of Bäumlér, and, like him, urges the desirability of marking out and measuring the area of dulness.—*Wiener klin. Wochenschrift*, 1896, No. 40, p. 909.

**Dyspeptic Asthma.**—BOAS, at the recent Naturforscher Versammlung, read a paper on this subject, concerning which there is a great difference of opinion. Boas has observed twelve cases of varying degrees of severity. In some there were diseases of the lungs or heart, in others only gastrointestinal disorders, especially atony with excess of hydrochloric acid. A satisfactory explanation of the attacks cannot be given. While French observers believe the lungs and right heart are implicated, some of the Germans hold that there is a reflex depression of the force of the left ventricle. Boas finds in some cases that the diaphragm is unduly elevated. The view of Albu that the theory of autointoxication explains the attacks is rejected by Boas on the ground of his own chemical examinations.—*Berliner klinische Wochenschrift*, 1896, No. 39.

**Amœboid Cells in Ascitic Fluid.**—VON LEYDEN and SCHAUDINN (*Sitzungsbericht der Kgl. Preuss. Akad. der Wissensch. zu Berlin*, 30 Juli, 1896) report the discovery of an amœboid protozoon in ascitic fluid. This was first found by Prof. Leyden in the fluid from a woman of twenty-two years, with heart-disease and ascites. In the course of numerous tapplings made for the relief of the latter colorless gelatinous cells were found, often aggregated in nests. They changed their shape, threw out pseudopodial processes and withdrew them again, showing active motion at ordinary temperature (23° to 24° C.). They could also be observed to unite in peculiar meshes with nodes on the processes thrown out. These nodes were at times loosened and in turn developed into cells. About the same time similar bodies were found in the ascitic fluid of a man of sixty-three years, who had carcinoma of the stomach. In the first patient nodular masses could be felt in the abdomen after tapping, so it was assumed that she, too, had cancer. The examination of the bodies was made by Dr. Schaudinn,

assistant in the zoölogical laboratory of the University of Berlin. Dr. Schaudinn finds the cells are parasitic protozoa, the exact classification of which he does not wish to make in the present unsettled state of the subject. "They are undoubtedly amœbæ, and perhaps nearly related to the free-living placopus."

The objection has often been made that the extensive work on parasitic protozoa, as those of malaria, dysentery, etc., has all been done by pathologists, not by specialists, and for that reason is often belittled by the said specialists. It is therefore a matter of congratulation that Prof. von Leyden availed himself of an expert "who for years has been working on protozoa." Whether he is able to distinguish these from body-cells any better than a Pfeiffer, an Adamkiewicz, or a Sudakewitsch, remains to be seen.

**Physiology and Pathology of the Thyroid Gland.**—In an address on the above subject VICTOR HORSLEY (*British Medical Journal*, December 5, 1896) reviews very carefully the experimental work that has been done with the object in view of ascertaining what the true physiological function of the thyroid gland is. The histological structure of the thyroid and of the parathyroid is dealt with, as well as the pathological changes that occur in the gland in myxœdema and exophthalmic goitre. In summarizing our present knowledge with regard to the function of the thyroid, Horsley states that it is generally agreed that whereas myxœdema and cretinism result from simple loss of function of the gland, exophthalmic goitre in its various degrees results from a perversion of that function.

**The Effect of the Weather on Hæmoptysis.**—EGGER (*Correspondenzblatt für schw. Aerzte*, 1896, No. 18) investigated this subject by means of the records of the Basel polyclinic in 1895, with the following results: the change from good to bad weather, especially in the transition from warm to cold or cold to warm seasons, corresponds with a change for the worse in the condition of many patients with pulmonary disease. In a large number of these cases coughing is increased, and in a small number of such persons the cough causes an increase of pressure in the pulmonary circulation and so favors hemorrhage. Changes in the weather which favor "catching cold" have similar consequences, as do epidemic bronchitis, influenza, etc.

**Herpes Labialis in Tubercular Meningitis.**—HABEL reports an instructive case from Eichhorst's clinic (*Deutsche med. Wochenschrift*, 1896, No. 42). The symptoms of meningitis were plain though not striking; there was pain on pressure over the left mastoid process, without positive signs of ear-disease; slight dulness over the apex of the left lung. Numerous herpes vesicles appeared about the mouth. Eichhorst made the diagnosis of tubercular meningitis, largely on account of the slow course and the moderate temperature. Lumbar puncture was practised, but without finding fluid. Post-mortem examination showed tubercular meningitis, affecting especially the pia of the base of the brain and in the Sylvian fossæ, with dilatation of the ventricles. There was also a caseous focus in the left apex and beginning miliary tuberculosis of all the organs.

Out of sixty-five cases of tubercular meningitis treated in Eichhorst's

clinic since 1884, this is the only one with herpes, the rarity of which symptom in the disease is well known. [Nothing is said in regard to the possibility of septic infection.] The cause of the emptiness of the dural canal was not disclosed in the case reported. In twelve cases examined by puncture in the Zurich clinic tuberculosis was present in eight. Bacilli were found in seven of these. Habel calls attention to the formation of a slimy coagulum in the fluid withdrawn in the tubercular cases, but not in others. The bacilli were found in the coagula.

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**Changes in the Gray Matter of the Spinal Cord in Pernicious Anæmia.**—TEICHMÜLLER (*Deutsche Zeitschr. für Nervenheilkunde*, viii. H. 5 u. 6) reports a case of pernicious anæmia with arteriosclerosis, paræsthesia, chronic enteritis, and increased knee-jerk. Post mortem small hemorrhages were found in the corpora striata and corpora quadrigemina. Microscopic examination showed changes such as have been described by others in the posterior columns, and, in addition, hemorrhages in both the gray and white matter, with degeneration in the anterior and lateral columns of the cord. The author combats the view that the changes in the cord in pernicious anæmia represent combined-system disease and looks on the change in the gray matter as of chief importance.

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**The Diagnosis of Malignant Tumors of the Lung by the Sputum.**—BETSCHART adds another to the small number of cases in which malignant disease of the lung has been diagnosticated by the sputum-examination. The sputum in this case was of variable color, often brownish-red, as in infarct, but never resembling raspberry-jelly, as was at one time thought to be the case in such conditions. Microscopically there were free fat-globules, leucocytes, and large numbers of epithelioid cells more or less aggregated. The sputum also contained particles visible to the naked eye—in fact, up to three mm. in length, yellowish or brownish, and gelatinous-looking, which proved to be carcinomatous. The diagnosis thus made was confirmed by post-mortem examination.—*Virchow's Archiv*, Bd. 143, H. 1.

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**Pneumothorax following Puncture.**—A. FRAENKEL reports the following instructive case: a man, aged seventy-three years, had signs of left-sided pleural effusion with severe emphysema. Puncture was made in order to determine the presence of fluid, but with a negative result. Soon after this the patient had collapse-symptoms, with cyanosis and frequent respiration, and died in four days. During life the upper left part of the thorax in front expanded less than the right, while the lower part of the left side was retracted strongly with each inspiration. There was no succussion, no metallic percussion-note. Autopsy revealed left-sided pneumothorax. The left lung was very much retracted, the pleural cavity empty. There was no evidence of inflammation. The lungs were soft and inelastic. On blowing up the left one no perforation could be found. Fraenkel concluded that the pneumothorax was due to the puncture, and warns against its use in cases of emphysema unless the indications are clear.—*Zeitschr. für prakt. Aerzte*, 1896, Nos. 13 and 14.

## SURGERY.

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Gastro-entero-anastomosis; Entero-anastomosis; Cholecystentero-anastomosis without Preliminary Opening of the Organs to be Anastomosed. —SOULIGOUX describes the following operations (*La Presse Médicale*, 1896, No. 59):

He produces on each of the two organs to be anastomosed an area of sphacelus. These two points are brought together, face to face, and retained by sutures; peritoneal adhesions form. At the end of forty-eight hours the sphacelated zones fall in, and the adhesions are more than sufficient to prevent separation of the two organs. The instruments needed are a pair of powerful forceps, a small Reverdin needle, No. 3 silk, and solid caustic potash.

*Gastro-entero-anastomosis.* After cœliotomy the first loop of jejunum is sought and a silk thread is passed through the mesentery, in order to draw the intestine out of the abdominal cavity. The intestine at the proper point is caught between the blades of the forceps and compressed with all the force the operator can employ. The two intestinal walls are thus made so thin that they are transparent. The same manœuvres are repeated upon the stomach. Here it is important that the assistant exposes well the fold formed on the stomach, and that he does not allow the mucosa to slip until it is secured in the grasp of the forceps.

Two fortified zones are thus determined on the two organs, the surfaces of which soon take on a black coloration. The peritoneum only has resisted the crushing effect of the forceps. The line of suture is commenced about 2 mm. from the margin of the contused area, uniting the two inner surfaces throughout their entire extent. At this moment the crushed surfaces are cauterized with caustic potash, after which the assistant sponges the area thus cauterized. The sutures are then placed in the two external borders. If any discolored area appears outside the suture, this point is inverted by additional sutures. The operation may be completed in twenty minutes. It remains only to close the abdominal cavity.

*Entero-anastomosis.* This is performed in the same manner as the gastro-enterostomy.

*Cholecystentero-anastomosis.* The author has endeavored to produce something analogous to the ampulla of Vater. In this procedure he opens neither the gall-bladder nor the intestine.

Upon the intestine he traces an elliptical incision, 2 cm. wide and 3 cm.

long, comprising only the serous and muscular coats. The flap thus made is removed. The mucosa exposed is compressed and cauterized to the extent of  $\frac{1}{2}$  cm.

Upon the anterior and posterior face of the gall-bladder a small needle, carrying a fine silk thread, is passed. The posterior thread is attached to the posterior border of the intestinal wound, the summit or base of the gall-bladder is crushed and cauterized with the potash, and the anterior thread is passed through the intestine in front of the intestinal wound, the posterior thread having already been so placed. On drawing on these threads the gall-bladder is invaginated in the intestinal canal, and while retained in this position by the assistant making traction on these threads, the suture around the margin of the anastomosis is made. The two original threads are then removed. At the end of four hours the sphacelus falls in and the communication is complete.

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**The Objects and Limits of Operations for Cancer.**—In discussing this subject CHEYNE (*British Medical Journal*, February 15, 1896) says: "The primary object of operation in cancer is, of course, the prolongation of the patient's life and the alleviation of his local trouble; and what I propose to assert in these lectures is that these results are in the most cases best attained by aiming, whenever it is possible, at the cure of the disease. Until recently, and even now, many surgeons approach operation in these cases impressed with the view that real cure is practically hopeless, and that with few rare exceptions the most that can be expected is prolongation of life for a variable length of time. I therefore hold and would strongly urge the view that the first question to be kept before us in investigating a case of cancer is whether there is a possibility of curing the disease or not. Such a point of view makes a great difference in the operation, for it is not then sufficient to remove only the noticeable disease, but it is necessary to take away as far as possible the parts in which the disease may have become disseminated, although still unrecognizable—in other words, possibly infected lymph-areas. Hence it is necessary in all cases where the disease has lasted any time, or extended at all deeply, not only to remove the primary mass freely, but also to take away the whole lymphatic area up to and including the nearest lymphatic glands. Thus the operation performed with the object of curing the disease becomes a much more extensive one, and consequently much more serious than that which simply aims at getting rid of the main trouble for a time and prolonging the patient's life. The first question to be considered, then, with regard to a case of cancer is the anatomical one, namely, whether it is anatomically possible to remove all the local disease and the probably infected lymphatic area so thoroughly as to give a fair chance of non-recurrence. If this is anatomically possible, the next questions are, What are the chances of death as the result of the operation? and What will be the subsequent functional result?"

"The primary object of operation in these cases being, therefore, cure, the limit of the radical operation is where there is no reasonable prospect of removing the whole disease, or where, along with a very poor prospect of success, there is a very high mortality from the attempt. In such cases I do not think the operation should be mentioned at all, for even when the

patient recovers from it, and has presumably two or three months added to his life, few would, I think, thank one for it, seeing that these two or three months have been spent in convalescing from a serious and, in the end, useless operation.

"But even in case where hope of cure or marked prolongation of life by radical operation is out of the question, operation may sometimes be advisable with the object of removing symptoms which are immediately threatening to life—such operations as tracheotomy, colotomy, etc.—or, in the second place, with the idea of taking the primary disease from a part—such as the mouth or throat—where its continued development means intense pain and trouble, and thus of substituting for these troubles an easier death from exhaustion. A *sine qua non* of such operations must, however, be that they are reasonably free from immediate risk; and with regard to the second class that there is a prospect of attaining the object of the operation, namely, the entire removal of the disease from the part operated upon. I do not think a dangerous operation is allowable for the relief of symptoms, however proper it may be if a cure may be hoped for.

"There are, then, two different objects to be held in view and two different questions as regards operation which we must bear in mind in treating a case of cancer, namely, Can we reasonably hope for a cure? for if we can, a serious or dangerous operation is permissible; or, cure not being possible, Can we decidedly ameliorate the patient's condition by operation, such operation, however, not involving any great danger to life."

In operations for cancer of the breast the author details and advocates the thorough radical operation, with the removal of the entire breast in all cases, the pectoral fascia, the lymphatic channels, and all the lymph-glands in the nearest groups, including the thorough dissection and clearing out of the axillary glands.

As regards the limits of operation for cure of breast-cancer, therefore, he would exclude from operation:

1. Cases of cancer *en cuirasse*.
2. Cases where there is a large mass in the axilla, involving the nerves.
3. Cases where large glands can be felt above the clavicle.
4. All cases where secondary cancer exists elsewhere.

In any case short of these he believes the patient should be allowed to choose. Even when the operation fails to cure the prolongation of life is often marked, much more so after the thorough operations than after the ordinary imperfect procedure.

As regards cures—that is, freedom from any recurrence for over three years—the author's statistics show that by the radical method of operating which he advocates the number of cures far outnumber, even in the comparatively few cases he has operated upon, the cures recorded by the older operators, which goes to show that this radical form of operation gives not only the best results as regards prolongation of life, but also the greatest proportion of cures. Of his 21 cases there were no deaths; 12, or 57 per cent., cures; 9, or 42.7 per cent., cases recurring externally or internally. This is the result obtained in all operable cases, and not in a selected series of favorable cases.

While the results are steadily improving, the proportion of cases which



succumb to cancer is still considerable, and will not, he thinks, be much reduced till patients and doctors understand that there is a good chance of radical cure from early and thorough operation in mammary cancer, and that a suspicious lump in the breast, especially in elderly women, is not a thing to be watched, for over 90 per cent. of the swellings of the breast in elderly women are cancerous.

Contrary to the usual dictum, it is now found that the most favorable of all cases for operation are those of atrophic scirrhus, and the more nearly a cancer approaches the atrophic form the greater is the chance of permanent cure. The author believes that the malignancy of cancer in the individual case has a great deal to do with the favorable result of the operation, more than the early period of the operation.

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**Concerning Nephrectomy.**—PERTHES (*Deut. Zeit. für Chir.*, Band xiii. Heft 3), after an exhaustive statistical study of the result of different operations upon the kidney, concludes that in all cases of hydronephrosis and pyonephrosis, and wherever surgical interference is indicated and the strength of the patient permits, the radical operation should be employed.

In long-standing cases of hydronephrosis, where large areas are involved and there are crises of colic, and in cases of pyonephrosis that endanger the whole system, the complete extirpation of the kidney should be the operation.

In contraindication to nephrotomy this operation makes possible a primary union and the return to health in a short time. This fact makes the danger of the operation much less than one would suppose at first sight.

We remove a sound kidney to free a patient from a urinary fistula. Should we produce a urinary fistula to save a worthless kidney?

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**The Sterilization of Catgut by Boiling in Water.**—HOFMEISTER (*Centralbl. für Chir.*, 1896) has modified his procedure for the sterilization of catgut by boiling, and now believes that the following method yields a perfectly sterile and in every way satisfactory preparation:

The raw catgut is to be wrapped evenly in a single layer upon strong glass plates (or nickel-iron frames). The thread should be drawn as taut as possible and the two ends firmly knotted. If separate pieces of thread are wrapped upon the same plate or frame, the ends must be securely tied.

The catgut is then transferred:

1. To a solution of formalin in water (2 to 4 per cent.) for from twelve to forty-eight hours.

2. Wash in running water for at least twelve hours, to remove the excess of formalin.

3. Boil in water for from five to twenty minutes.

4. Preserve in absolute alcohol to which have been added 5 per cent. of glycerin and 4 per cent. of carbolic acid or 1 per cent. sublimate (in case metal frames are employed the sublimate should not be used). For use the holders have to be put upright in an oblong glass trough; in this way the thread can be drawn easily, but still will not loosen itself spontaneously.

While the exact strength of the formalin solution and the length of time of the boiling do not influence the result in particular, the careful wrapping

and the thorough washing are indispensable to the attainment of a satisfactory result. The firm tension made in wrapping the gut is still further raised by the action of the formalin (therefore strong plates should be used) and must be maintained until the hardening is accomplished.

The plates must remain in alcohol for some hours before the knotted end of the thread is loosened. If the tension has been deficient, the thread gets thick and elastic like rubber, and cannot well be used for ligature-material.

If the formalin is not entirely washed out before boiling the gut, the thread will break easily.

The arrangement of the threads in but one layer permits of equal access of the formalin and of the washing and boiling water. The hardened and washed catgut may be preserved in alcohol indefinitely, without injury, before the boiling. It may also be boiled repeatedly, if the end of the thread is tightly knotted again, to maintain the tension.

The author claims for this procedure :

1. The absolute destruction of germs.
2. Preservation of the tensile strength of the catgut.
3. Avoidance of complicated methods and expensive instruments.

The thread, wrapped up once, need not be touched with the fingers from the beginning of the sterilization until used. The bacteriological examination of the gut thus prepared has proved it to be free from germs.

In Bruns's clinic the method has been in use since February, and has given satisfaction in every way.

**Immediate Suture of the Bladder after Hypogastric Incision.**—DE VLACCOS, in the *Revue de Chirurgie*, 1896, No. 8, favors immediate suture of the bladder after suprapubic lithotomy. This method has been employed by Albert, Nicoladoni, Ultzmann, Kispert, Maximow, Vincent, Brenner, Irschik, Herson, Bassini, and others.

The author thinks the contraindications to the immediate suture are very rare; personally, he has never seen a single case. He cites an example with considerable alteration of the bladder-wall successfully sutured. The difficulty of absolutely closing the bladder should not deter surgeons from using the method, as a catheter retained in the bladder will keep it empty, and there will not be tension enough to cause leakage in the prevesical space. The suture may be made with silk or catgut. De Vlaccos prefers the latter. The method has been equally as successful in old age as in childhood and middle age.

He has allowed his patients to get about on the twelfth or fifteenth day.

**Conclusion and Practical Remarks on 300 Cases of Breast-excision for Malignant Disease.**—SNOW, after briefly reviewing his experience in the cases mentioned in the title (*British Medical Journal*, 1896, No. 1868), concludes as follows :

Infection of the bone-marrow is the great obstacle to radical cure by operation in mammary carcinoma. This takes place in all ordinary cases within six months of inception, frequently earlier; its symptoms do not appear until within the second year; they may not be accompanied by nodular deposit or other palpable evidence of cancer for five or six years more. In

the class of cases known as "atrophic" the condition may be delayed for several years.

Hence, these latter excepted, apparent immunity from "recurrence for three years" is a wholly inadequate basis on which to pronounce the disease radically extirpated, unless insidious marrow-symptoms are also excluded by careful examination, and unless there is good reason to believe that excision has been performed before the marrow has become implicated. The most important practical point in excision of the female breast is a wide dissection of the subcutaneous connective tissue around the diseased organ, from sternum to axilla, from the subclavian fossa to the cartilage of the seventh rib. This tissue is the really dangerous tract to be feared as a nidus for recurrence; not, as the author holds, prolongations of the mammary parenchyma. But it can always be adequately extirpated by dissecting off a flap of healthy skin, and so bringing the edges to immediate union without undue tension, as was done in all his second class of cases.

No advantage whatever is gained by the destruction of an extensive skin-tract. In every single instance he has yet met with the utmost benefit that surgery could confer was perfectly compatible with the union of the greater part of the wound by first intention. Should the skin be infiltrated, no amount of ablation will avail to prevent reappearance, previously insured by the marrow-condition. One such case is now under his care. A single lady had the skin of the left side from clavicle to abdomen, from sternum to posterior axillary fold, removed by an eminent surgeon in June, 1895, and replaced by grafts from shoulder and thigh. The whole tract aforesaid is now a deep depression, at the bottom of which lie the ribs, covered by a thin cicatrix. The patient has extensive deposit above the clavicle, in the opposite mamma and axilla; the sites whence the grafts were taken being occupied by large keloid scars half an inch thick.

Another startling novelty, only to be mentioned with almost incredulous surprise, is amputation at the shoulder-joint for the purpose of procuring a covering flap from the deltoid.

If we encounter instances of scirrhus, or even of encephaloid (acute) carcinoma, of but two or three months' duration, no pains should be spared to eradicate permanently the disease by dissecting out the entire mamma, a wide area of subcutaneous tissue around, and the contents of the axilla; and at least one and one-half hours should be devoted to that purpose. On the other hand, in advanced cases of long standing it is futile to risk life by prolonged and heroic measures when we know there is a deep-seated nidus which we cannot touch. The utmost advantage we can attain is the removal of the gross lesions without risk; prompt union of the wound; and then, by after-treatment with opium and cocaine, to procure a state in which the disease remains stationary for years or advances with almost imperceptible slowness. Examples of this Snow expects to narrate in another contribution.

Partial amputation of the mamma for carcinoma is wholly inadmissible, unless for purposes merely of palliation. For the smallest scirrhus "kernel" extirpation should be thorough. Thus there could not have been a more favorable case for radical cure than that of a woman, aged forty-seven years, who appeared in August, 1892, with a growth the size of a bean, of two months' duration, at the upper part of the right breast, and without any gland

enlargement. As he was about to leave town another surgeon operated, and unfortunately contented himself with a bare removal of the tumor. In the following October the disease was found to be rapidly advancing in the remainder of the breast, and was then at once excised with the axillary contents; now, however, too late, as visceral metastases shortly became evident.

At the beginning of the period referred to (1876) evacuation of the axillary contents was only resorted to occasionally, and "recurrence" here took place usually within six months. It is now very justly the rule; and even the worst cases seldom show any superficial deposit for at least two years. Yet to this routine practice three exceptions should be noted: (a) intracystic cancer-growths; (b) fairly recent atrophic cases; and (c) scirrhus appearing close to the sternum, whence the axilla is much more slowly infected than from other regions of the organ, the lymph-current flowing primarily to the thymus and mediastinal lymph-glands.

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**Subphrenic Abscess and Resection of the Kidney.**—Subphrenic abscesses resulting from suppuration of the spleen are of rare occurrence, and the case detailed by CRAMER (*Deut. zeit. für chir.*, 1896, Band 42, Heft 6), as operated upon successfully in Professor Bardenheuer's clinic, is of great interest.

In the beginning of April the patient had a high fever and pain in the left abdominal region. In May the symptoms were of pleuritis. In July the patient had the symptoms of typhoid fever. From September to the middle of October the patient appeared to be well, and then in November she became violently ill with symptoms pointing to a subdiaphragmatic suppuration.

The diagnosis was finally established in consequence of the low position of the spleen, the dulness over the lower portion of the left thorax, and especially upon the to-and-fro motion of an exploratory needle synchronous with the respiration, and from which pus had been withdrawn. In other words, the inotility of the abscess and of the enlarged spleen.

Such abscesses of the spleen are rare, and arise from infarction after infectious diseases, as typhoid fever, pyæmia, malarial fever, articular rheumatism, etc., or may come through the contiguity of abscess in other organs. In operating the pleura should first be exposed, but not opened, to determine whether there is a pleuritic effusion or suppuration. If this is present, it should be opened and the abscess attacked through this channel. If, however, it is not involved, the incision should be closed and the abscess opened posteriorly beneath the diaphragm.

The treatment of the splenic abscess depends on the extent of the involvement; it may be resected, or the entire organ may be removed if the disease is too extensive. The origin of subdiaphragmatic abscesses is frequently connected with disease of the pelvic viscera in women. The author reports such a case in which, after the opening of the abscess, the adnexa were successfully removed.

The author also reports a case of tuberculous abscess of the kidney cured by resection of the kidney and removal of the diseased portion. The section was made through sound tissue. The pelvis of the kidney was opened, and its internal aspect was seen to be healthy. The hemorrhage was not marked; the wound was tamponed, as was the perinephritic abscess-cavity. During

the healing the dressing was changed daily, as it rapidly became soaked with urine. The amount of urine became less and less, and finally disappeared altogether. There was no post-operative fever. After the urine ceased to flow the granulating wound was drawn together with adhesive plaster and rapidly united. The urine is free from albumin, and the wound remained completely closed.

In the treatment of these cases the author believes nephrectomy is indicated when the hæmatogenic tuberculosis has invaded the major portion of the kidney, when the pelvis of the organ is involved and it is impossible to decide how far the disease extends. If the ureter is diseased, it should be removed as far as the disease extends at the same time. If this is not done, there is danger of establishing an abdominal ureter fistula that will not heal.

The cases reported show that there are forms of this disease in which a portion of the kidney may be resected and a portion of the organ be retained with the hope of re-establishment of function and a compensatory hypertrophy of the portion remaining.

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**A Study of Pyæmia and Sepsis.**—HENTSCHEL, in a monograph (*Cent. für Chir.*, 1896, No. 40), in studying this form of disease, classifies its manifestations under the forms of pyæmia, septicæmia, sepsis, and sapræmia.

Pyæmia is that condition produced solely by pyogenic micro-organisms. Septicæmia is that form in which the micro-organisms develop in the blood only (rare in man). Sepsis and sapræmia are systemic intoxications arising from a local infection.

He illustrates pyæmia by a case in which a tendo-vaginitis of the index-finger was followed by a suppurative arthritis of the shoulder-joint. The diplococcus lanceolatus (Fränkel-Weichselbaum) was found by microscopic investigation and cultures at both points, but would not produce suppuration after inoculation into animals.

In a second case pyæmia followed a furunculosis of the lip. The culture showed staphylococcus citreus and other forms.

Two other cases illustrate typical sepsis; *i. e.*, toxæmia. In both cases there was an absorption of toxins after gangrenous processes. One was a compound fracture of the leg followed by consecutive sepsis, which became systemic despite an amputation. The bacteriological examination showed the blood to be entirely free from bacteria or spores.

The second case on which a post-mortem examination was made showed how extensive the systemic involvement was. A periproctal abscess, with no tendency to healing, gave rise to the systemic infection. No bacteria were found in the blood. There was marked cell-necrosis. The symptoms were those of grave pyæmia. The author is of the opinion that in the production of these cases of pyæmia the absorption of the toxins is not the only question, but that the interchange between the living bacteria and the cells of the body is of more importance, although it should not be forgotten that the intoxication of saprophytic and pyogenic micro-organisms is greatly increased by their combination.

**The Causation of Certain Malformations of the Extremities.**—HLAWACEK (*Deut. Zeitsch. für Chir.*, Band 43, Hefte 1 und 2, 1896) reports a number of cases of defect in the development of the bones of the extremities. He explains their causation as follows:

1. The radius, os naviculare, os multangulum majus, metacarpus, and the two phalanges of the thumb, are formed by a transverse differentiation in the original radial line of Gegenbauer's archipterygium.

2. If pressure is exercised, at a certain time, upon this radial line, through a disproportion between the fœtus and amnion cavity, when the development and differentiation into its individual parts have not as yet progressed so far that each part can develop further of itself, there may be produced a destruction of the radial line *in toto*, and through the same cause a pathological position of the hand (as in cases of defective radius with but three or four fingers on the hand): the distal portion of the proximal end of the radius may escape this destruction (cases in which the upper portion of the radius is present).

3. If this pressure is exerted at a period after the differentiation has already taken place and development has progressed further, the injury becomes localized to the particular part or to an injury to the punctum minoris resistentiæ (epiphysiolysæ), which is not direct upon the particular part, but influences its later development (cases of rudimentary distal portion of the radius with presence of carpal, metacarpal, and phalangeal bones).

4. The pressure may produce coalescence, and, as a result, total or partial defect of the radius.

The author also reports a case of defective development in the femur seen in a fourteen-year-old girl. The deformity involved the central proximal portion of the femur, while the entire remainder of the limb was normal in structure and development. There was an absence of the joint between the femur and pelvis.

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**Metastatic Exanthemata of the Skin due to Septic Infection.**—MEYER (*Arch. für klin. Chir.*, Band 52, Heft 1, 1896), after a careful review of the literature dealing with exanthemata found in contagious diseases, says that the evidence is not sufficiently strong as yet to prove that they are true metastases of cocci, but that the evidence clearly points in that direction.

Much more interest is attached to the group of observations in which the same forms of bacteria have been found as those which apparently produce the original disease. These are the cases of sepsis and pyæmia with cutaneous metastases.

After reviewing a number of cases already reported, he details a case in which the microscopic and bacteriological study showed that the case was one of true metastases to the skin from a general systemic staphylococcus infection. Intracapillary masses of cocci which were found and must be considered the cause of the eruption could only have reached their location through the vascular system. The microscopic section showed that in the youngest eruptions, where there was still present inflammation of an acute type, there were no cocci found in the epidermis, but were always first seen in the papillary layer. In no section were the hair-follicles found to be infected, although they were often in close contact with the foci of suppuration and are in the majority of cases the point of entrance of impetiginous eruptions.

## OPHTHALMOLOGY.

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 UNDER THE CHARGE OF

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The Electro-magnet in the Diagnosis of Particles of Iron or Steel within the Eyeball.—E. VALUDE (Paris), in a paper upon the use of the electro-magnet in ocular surgery (*La Médecine Moderne*, 7 Ann. No. 76), calls attention to its diagnostic value in some cases in determining that a piece of metal capable of attraction by the magnet is within the eye. Thus in the case of a doubtful foreign body suspended in the vitreous, the bringing of the magnet suddenly close to the eye would cause it to move visibly if subject to the magnetic attraction. The same result would be attained by bringing the instrument close to the eye and alternately closing and opening the circuit, making the magnet alternately active or neutral.

Even when the foreign body cannot be seen its presence and nature can be ascertained in this way when the proximity of the magnet causes pain through the disturbance of the position of the foreign body. Positive evidence of this kind would be conclusive. Valude, however, reports a case in which the failure to cause pain by bringing the magnet close to the eye was rather misleading, for the eye being subsequently enucleated a piece of steel was found within it. He points out, in this connection, that a more powerful magnet might have elicited the symptom.

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Formation of Artificial Pupil by Extra-ocular Iridotomy.—J. B. LAW-FORD (London) describes (*Ophthalmic Review*, vol. xv. No. 178) and urges the advantages for certain cases of the operation proposed by Schoeler. He regards the operation as applicable to: (1) cases of opacity of the cornea involving the central area, but leaving some portion of the periphery clear; (2) cases in which there is stationary partial opacity of the lens, either a small nuclear, sharply defined opacity, or an anterior polar cataract, the base of which is as wide, or nearly as wide, as the pupil; (3) cases in which there is, as a result of disease or as a congenital defect, obstruction of the pupil by deposit on the anterior lens-capsule, the pupillary margin of the iris being free.

The operation is performed by making an incision in the cornea, close to but not at the sclero-corneal junction, and about 5 or 6 mm. in length. The knife is carefully withdrawn, so that the iris may not follow it through the wound. The blades of a pair of *fine* curved iris-forceps are then introduced through the incision, and the iris gently grasped close to the pupillary border and withdrawn. The forceps should have no teeth, but slightly

roughened or finely milled blades. The protruding portion of iris is picked up and divided by a single snip of the iris-scissors. The cut should be at right-angles to the pupillary margin, and should extend through half the width of the iris. The protruding part of the iris is then replaced with a spatula and a solution of physostigmine instilled.

**Serum-therapy in Diphtheria of the Eyes and Post-diphtheritic Palsies of the Ocular Muscles.**—R. GREEF (Berlin), from a review of reported cases and the records of his own cases, finds (*Deutsche medicinische Wochenschrift*, 1896, No. 37): of forty-two cases of true diphtheria of the eyes, one had progressed so far toward recovery that the share of the treatment in producing the result is doubtful, and two cases terminated fatally in spite of the serum-injections; but of the remaining cases the result was extremely favorable in thirty-seven. Cases of spurious diphtheria of the eyes have not been sufficiently distinguished from those of true diphtheria to decide yet as to the influence of serum-therapy upon their course. As to the prevention of post-diphtheritic paralysis of the accommodation, this method of treatment seems to be without the slightest influence; and in the limited number of cases in which its action upon the course of diphtheritic paralyzes of the ocular muscles has been observed, it has not been shown that any important beneficial influence is exerted by the antitoxin-serum in this respect.

**The Management of Glaucoma.**—S. O. RICHEY (Washington) has never seen a case of glaucoma, acute or chronic, that did not have a history of gout, inherited or acquired; and regarding the condition as the local expression of a general dyscrasia, lays down the following propositions as a guide in its management (*Annals of Ophthalmology and Otology*, October, 1896):

1. When syphilis is the agent of causation the indications are clear—antisyphilitic treatment.
2. Acute or chronic glaucoma of other origin finds its initial cause and beginning in the digestive tract.
3. A departure from the normal physiological processes in the digestive tract intoxicates slowly, progressively, and accumulatively both the vascular and nervous systems, producing a degrading tissue-change in various organs; and interstitial ophthalmitis (glaucoma), an interstitial nephritis, etc., which may be precipitated into a violently active form by injury, exposure, a more than usually indiscreet meal, or by a severe emotional crisis.
4. That chronic simple glaucoma consists in a hyperplasia of connective tissue, involving ultimately the whole bulb, and cannot be cured by operation.
5. That the acute form is vascular in character and may be engrafted upon the chronic form.
6. That to meet the indications on this basis we must begin with the beginning of the disease and correct individual habits.

In the way of specific measures, Richey recommends in acute glaucoma the general hot-bath, the use of a myotic with taxis of the eyeball, the prompt exhibition of colchicine, the hot-bath repeated after several hours, if necessary, always keeping the patient warm after it. After gaining control of an attack, prophylaxis, as in the case of chronic simple glaucoma. In chronic glaucoma baths, always hot, several times a week, in a warm room, and immersing the whole body. The bath need not be hot enough (102° to 104°), or continued long enough, to produce sweating. A weak myotic



collyrium must be persisted in, with daily taxis for a few minutes, until the tension is normal and remains so. A mixture of sodium salicylate, ammonia, and taraxacum should be pushed to the point of physiological tinnitus; and continued as long as necessary, except suspending it to combat symptoms of irritable glaucoma that may arise, with colchicine, if it continues to act well. The intestinal tract must be soaked with hunyadi janos, three or four ounces being taken at bedtime, and repeated every night, perhaps in less quantity, until the stools become yellow.

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**Pigmented Striations in the Fundus.**—B. WALSER (Vienna) reports (*Archives of Ophthalmology*, vol. xxv. No. 3) two cases of this condition. Both patients had normal acuteness of vision and normal visual fields, but gave histories of previous serious ocular inflammation. He proposes the following classification for such stripes: 1. Prevascular, attending retinitis proliferans. 2. Perivascular, with periarteritis. 3. Retrovascular, due to detachment or to folding of the retina. His cases were believed to belong under the last heading. The color of the stripes was gray, not brown.

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**Asthenopia and Nasal Obstruction.**—P. W. MAXWELL (Dublin) has observed many patients with chronic aural catarrh who suffered from asthenopia, and who were relieved of the asthenopia by nasal treatment given with a view of benefit to the aural disease. He has found (*British Medical Journal*, No. 1865) that asthenopes who frequently or habitually breathe through the mouth are more likely to be benefited by nasal treatment than are those in whom the nasal mucous membrane is quite as abnormal, but who can breathe freely through the nose. The most usual causes of nasal obstruction, in this connection, are adenoids in the nasopharynx and enlarged turbinates. The former should be removed and the latter reduced by local treatment. Many of these cases would be relieved by glasses; but some get no benefit from any glass until the nose is cured.

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## DERMATOLOGY.

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**Mycosis Fungoides.**—E. BESNIER (*Pictorial Atlas of Skin Diseases and Syphilitic Affections*, Part I., 1896) presents a portrait representing the nodular and ulcerative stages of this disease (known also as granuloma fungoides) which is both true to life and excellent, but the notes and observations of this distin-

guished and lucid writer are even more valuable. The French school (with Besnier as one of its chief exponents) has done much to elucidate the many features of this disease. Until lately it had not been carefully studied, mainly because of its protean nature and the polymorphism of its manifestations, its periods of quiescence or of temporary remissions, and because of its frequently very prolonged course and duration. The case reported was that of a man, aged forty-seven years, the first affection of the skin having occurred in 1871, in the form of attacks of pruritus, with nocturnal paroxysms, worse in winter, but unaccompanied by any eruption. In 1872 smooth red patches on the trunk and abdomen, varying in intensity but always extremely pruriginous, were first noticed. Next year there was a lull. The following year an exacerbation of the disease compelled the patient to enter the St. Louis Hospital, where he stayed two months, and was discharged with the diagnosis of "prurigo." The following year he again entered the same hospital under Lallier, when the model was made and labelled "lichen ruber" (?). The whole body presented finely papular areas of a common variety of the poorly developed lichenoid patches which occur in the initial stage of mycosis. In 1876 there were very frequent attacks of boils, succeeded in the following years by a recurrence of the previous eruptions with severe and rebellious itching. Discouraged by the failure of all treatment, and his general health being good, the patient gave up seeking medical aid and went back to his business. Not until 1887 (*i. e.*, sixteen or seventeen years after the onset of itchy and cutaneous eruptions) did he return to the hospital. In the preceding two months round, red, pea-like lesions had developed on the red squamous patches over the front of the thorax, followed soon by small knob-like tumors which became united at their bases by diffuse swelling, which spread from right to left toward the axillæ, and from that time to his death the production and evolution of tumors never ceased for a moment. All the nodules and tumors did not undergo the same uniform process of evolution; some softened more or less rapidly in the centre, broke down, ulcerated, leaving craters with yellowish bases, wide, gaping openings, suppurating and discharging freely. During the year 1888 the increase in the number and agglomeration of the tumors was so great as to form a kind of shield over the thorax, around which lichenoid patches and knob-like tumors continually formed; numerous hypertrophic patches developed on the neck, around the axillæ, and elsewhere on the trunk, but there were very few on the limbs. Simultaneously some of the patches or tumors healed imperfectly, leaving a prominent and irregular scar. The general health continued good, and he suffered little or not at all except from the persistent itching. All the lymphatic glands were very large, but there was neither leucocythæmia nor enlargement of the spleen. Emaciation later set in, and the patient for the first time became anxious. The following year loss of appetite, rapid emaciation and weakness occurred; the lichenoid and itching patches remained persistent, but all the tumors shrank, and the purulent secretion diminished greatly. The patient succumbed a month later. No important macroscopic lesion was observed other than increase in the size of the spleen and tumefaction and ulceration about the upper laryngeal orifice, aryteno-epiglottidean folds, and the posterior surface of the larynx. The trachea, lungs, pleura, alimentary canal, and liver were all normal.

Besnier very properly calls attention to the following practical diagnostic points: (1) In all cases of doubtful itching skin disease, persistent, not amenable to ordinary treatment, whether it be like some indeterminate "erythrodermia," or psoriasis, or eczema (squamous, diffuse, discoid, or circinate), or like an urticaria, not amenable to treatment, or a lichenoid prurigo, and the like, the question of the possibility of mycosis fungoides in an early stage must be considered. The physician who remembers this may avoid an error in diagnosis. (2) The initial premycotic stage is not an incubation, properly so-called, but is the disease in action, not only in the parts which show lesions, but also in the apparently healthy parts, where its subjective manifestation is itchy.

[The case is referred to because it illustrates the peculiar and insidious course that this disease often pursues, rendering the diagnosis difficult.]

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**Bullous Dermatitis from Quinine.**—J. C. JOHNSTON (*Journal of Cutaneous and Genito-Urinary Diseases*, July, 1896) records the case of a man, aged thirty-seven years, who had before experienced two attacks of quinine-dermatitis from taking two two-grain quinine pills. Two fifteen-drop doses of compound tincture of cinchona caused the present outbreak. Two days after the ingestion there was intolerable itching, and soon vesiculation on the genitalia, face, and ears, and the whole general surface of the body rapidly became the seat of a scarlatinoid dermatitis. As this began to decline the palms and soles became affected with blebs, some of which were large in the first outbreak, as much as eight ounces of serum being evacuated. The blebs recurred, and it was five or six weeks before recovery was complete, the palms being the last to recover. The chief points of interest are the rarity of the bullous manifestation from quinine, and the great disproportion between the violence of the cutaneous outbreak and the small amount of the drug ingested.

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**Tubercular Leprosy of the Face and its Treatment.**—E. BESNIER (*Pictorial Atlas of Skin Diseases and Syphilitic Affections*, Part IV., 1896), in considering this subject gives two photographs of a patient, one of which was taken in 1888, before treatment, the other in 1896, after eight years had elapsed, showing wonderful improvement. Internal treatment (chanmoogra oil up to 300 drops, salol up to 5 grammes daily) was perseveringly administered, whilst the tubercles were destroyed with the cautery and the methods for external reduction to be referred to. Chlorate of potassium, 15 grains daily, was taken for a period of three years (by the patient, unknown to the physician), but Besnier is not willing to say how far this latter medicine assisted in the improvement, which was already, as a matter of fact, accomplished. The point of interest in the local treatment is the beneficial result of a long course of electro-galvanic cauterization, which Besnier regards as a certain means of reducing leprous tubercular formation wherever localized. The thermo-cautery may also be used for the same purpose, but its effects are more difficult to limit; cicatrization of the ulcers after the crusts separate takes longer, and, above all, the plastic results are much less satisfactory. By the method advocated each tubercle is cauterized interstitially by means of single or multiple points, or by electro-caustic bars

when the surfaces to be destroyed are large. After cauterization should follow daily spraying with weak carbolic-acid water and dressing with sublimate or iodoform gauze, together with the management of cicatrization by means of nitrate of silver or zinc pencils, and the like. The same galvano-caustic application should be made to all affected points of the mucous membranes of the lips, nose, mouth, tongue, and pharynx. By their means it is quite easy to check and destroy the leprous foci so common in all these parts, and the results obtained are very remarkable. In the patient whose case is described, and in many other cases, the treatment was effective in limiting and destroying the disease in the mucous membranes.

[The experience of this writer corroborates that of other observers, namely, that much can be done by both local and general therapeusis to mitigate and relieve the manifestations of this disease, especially in countries where the disease is not epidemic.]

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## OBSTETRICS.

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UNDER THE CHARGE OF

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**The Use of Steam as an Antiseptic in the Treatment of Puerperal Endometritis.**—In the *Centralblatt für Gynäkologie*, 1896, No. 49, KAHN reports his results in the treatment of septic puerperal endometritis by the intra-uterine injection of steam. The apparatus consisted of a kettle, heated by an alcohol-lamp, to which were attached a thermometer and also a hose terminating in an intra-uterine applicator having a hollow stem or handle. The thermometer should register 200° C. before the steam is used. He is accustomed to begin with steam at a temperature of 100° C. for two minutes, then allowing the temperature to rise to 115° C. for one minute. The higher the temperature of the steam the better is the result. Very little complaint of pain was made by patients; in some cases uterine contractions caused after-pains. In cases where pieces of placenta or membrane have been left within the uterus they must be removed, either by fingers or curette, before the steam is used. An intra-uterine douche is usually employed for two or three days after the use of the steam.

His first reported case was that of a multipara who had fever on the third day after labor. The lochial discharge was very foul. Pieces of placenta were removed from the uterus, but without result. The fever and foulness of the lochia remained. Accordingly steam was injected for one-quarter of a minute at 105° C. It caused no pain, but slight improvement, and on the

following day it was used at a temperature of 112° C. for one-half of a minute. The temperature steadily fell and the patient made a rapid recovery.

The second case was that of a primipara who had no attendance at labor, and who had slight fever which resisted intra-uterine douches. Steam was employed at 110° for one-quarter of a minute. The patient seemed much improved, but five days afterward a sudden rise of temperature accompanied the development of pyæmic abscesses in the elbow and in the clavicle. These subsided, however, and the patient ultimately recovered.

His third case was that of a multipara in whom steam was employed at 105° C. for three-quarters of a minute. This was followed by intra-uterine injections. The microscopic examination of the discharge from the uterus showed a great number of cocci in which was a diplococcus.

The fourth case was a multipara who was aborting at about three months. The placenta was retained and a very foul discharge resulted. She was admitted to the hospital suffering from fever. Under chloroform-narcosis a retained placenta was delivered and the uterus thoroughly douched. A temporary improvement only followed. Steam was used at a temperature of 105° C., and its use was followed by immediate improvement in the symptoms. Bacteriological examination of the contents of the uterus showed an abundance of gonococci present. The patient collapsed after an intra-uterine douche, but rallied again. On the day following chills and fever developed, and steam was again employed for one-quarter of a minute at 115° C. The temperature fell, but subsequently rose again and was accompanied by vomiting. Steam was again applied at 110° for one-quarter of a minute. Prolonged irrigation of the uterus was tried, but without benefit. The patient speedily failed, dying in collapse.

His next case was that of a multipara who had a normal labor, but who became septic. The uterus was emptied of bloodclots and pieces of membrane and packed with gauze. As fever increased steam was applied at 110° C. for one-half of a minute. Among the contents of the lochia were found tubercle-bacilli. The patient made, however, a good recovery.

The seventh case was that of a multipara who had had *placenta prævia lateralis* and had suffered from hemorrhage. The lochia was foul. The patient did well for a few days, and then had a severe chill with high temperature. Steam was employed at 115° C. for one-half a minute. Its use was followed by improvement in the patient's general condition. This patient ultimately made a good recovery. The secretion from the uterus was examined and found to be sterile.

In his eighth case, a primipara, a considerable mass of placenta had been left within the uterus, attached to its anterior wall. Steam was injected for one minute at a temperature of 115°, causing vigorous contractions in the uterus. Bacteriological examination of the lochia revealed the presence of gonococci.

His ninth case was that of a multipara taken with chills and fever and severe pain in the abdomen. Steam was employed at 100° C. for two minutes. The temperature, however, remained for some days apparently uninfluenced by the use of steam. The patient finally made a good recovery.

From his experience Kahn concludes that steam produces an effect upon the uterus in several ways. It increases the sensitiveness of the uterus;

stimulates contractions; the foul odor from the lochia disappears, while in no instance have bad results afterward been observed. The advantages claimed for this method are its efficiency in destroying bacteria within the uterus and also its favorable effect upon the general condition of the patient by stimulating the circulation of the blood and of lymph.

**Retroversion of the Pregnant Uterus, with a New Method of Treatment.**—MURDOCH CAMERON, in the *British Medical Journal*, 1896, No. 1870, reports a case of retroversion of the pregnant uterus and describes his treatment. He has found that disturbances of the bladder are among the first symptoms of this condition. Overdistention is frequently present. In most cases the uterus can be replaced before the third month if an anæsthetic be given. In a small number of cases impaction with adhesions is present, and extirpation of the uterus or treatment by abdominal incision is required. In fatal cases retention of urine becomes complete. Fever is present and bearing-down pains at the pelvic outlet, with great restlessness, delirium, intermittent pulse, coldness of the extremities, convulsions, and possibly rupture of the bladder. Previous to this case Cameron had never met one in which reduction was impossible.

The patient was a multipara who had enjoyed good health. The first symptom noticed was disturbance of the bladder, retention of urine being complete, with vomiting and constipation. The bladder was emptied by catheter and a considerable amount of blood was found in the urine. The patient was seized with labor-pains and hemorrhage. She was removed to a hospital. Upon examination under chloroform the os uteri was found above the symphysis. The bladder was irrigated, when bloodclots and shreds of mucus were removed. A blood-cast of the ureter, some fifteen inches long and about the thickness of a quill, was expelled. As the patient's condition was becoming critical, abdominal section was performed. In order to empty the bladder an opening was made upon its anterior surface outside the peritoneum. A large quantity of bloody urine and clot was extracted. Its walls were very much thickened. An assistant pressed the uterus up through the vagina while the operator raised the womb with great difficulty out of the pelvis. The bladder incision was sutured with fine silk and a double catheter was left within the bladder. The abdominal wall was closed in the usual manner. The patient made an uninterrupted recovery and was subsequently delivered of a healthy male child. Cameron calls attention to a serious complication in these cases which follows the sudden relief of a suddenly distended bladder. If urine be rapidly removed, hemorrhage is apt to follow, and hence the bladder should be slowly emptied or boric solution injected as the urine is withdrawn. A blood-cast of the ureter has seldom been observed.

**The Results of the Modern Cæsarean Section.**—In the *Archiv für Gynäkologie*, 1896, Band 52, Heft 2, STREBEL repeats the proposition of Wyder to the effect that craniotomy upon the living child must cease so soon as Cæsarean section shows an equally low mortality-rate for the mothers. He recalls the fact that at the hands of Leopold, Sänger, and Braun the mortality of Cæsarean section has fallen to 8, 4, and  $3\frac{22}{100}$  per cent., respectively. He

does not consider symphysiotomy as offering greater advantages than Cæsarean section. Strebel reports ten cases of Cæsarean section in Wyder's clinic at Zurich, which may be summarized as follows:

Case I. was that of a multipara who had lost a child in difficult labor, and who had a pelvis whose true conjugate was 5 cms. It was determined to perform hysterectomy, as the woman could never bear a living child in the natural way. Hemorrhage was prevented by an elastic ligature about the cervix, the ovarian arteries were tied, the uterus amputated two fingers' breadth above the ligature, and the stump closed with buried-silk sutures through the muscle and fascia, the serous edges being brought together by continuous suture. The stump was dropped, and the abdomen closed without drainage. An uninterrupted recovery for mother and child followed.

[It is interesting to note in the report of this case that no mention is made of ligature applied directly to the uterine arteries. The operator seems to have trusted to his firm closure of the stump by buried-silk sutures, followed by the continuous suture of the serous surfaces. Should it be found that this method is reliable, it would certainly avoid the danger of wounding the ureters.—ED.]

Case II. was that of a multipara on whom craniotomy had been previously done. Her pelvis was a justo-minor, and the operation was cœlio-hysterotomy, the uterus being sutured and returned to the abdominal cavity. Mother and child made a good recovery.

Case III. was a multipara who had a flat rachitic pelvis, with a true conjugate of  $5\frac{1}{2}$  cms.; in this case cœlio-hysterotomy was done, the uterus being sutured and retained. Mother and child recovered well.

Case IV. was a primipara in whom the pelvic deformity and operation employed were identical with the preceding. The result was also good.

In Case V., in a multipara who had lost three children, the simple flat pelvis was the deformity present. Cœlio-hysterectomy was successfully performed, mother and child surviving.

In Case VI., a primipara was found to have a simple flat pelvis. The forceps had been applied, and efforts made at delivery before the patient entered the hospital. The contraction-ring was well marked, and cœlio-hysterectomy was performed in the interests of mother and child. After the child was extracted hemorrhage from the womb occurred; it was impossible to suture the uterus, although every means was employed to secure its contraction. Hysterectomy was performed, and, as it was feared that the uterus had become infected, the stump was left in the lower angle of the abdominal wound. The mother recovered, but the child did not survive.

Case VII. was that of a multipara with justo-minor pelvis, who had had repeated premature labors, followed by the death of the child; here cœlio-hysterectomy was performed with good results for mother and child.

Case VIII. was that of a primipara with an obliquely contracted pelvis. Cœlio-hysterectomy was performed, and some difficulty was experienced in stopping hemorrhage in the vessels of the right broad ligament; these were secured, and the stump closed and dropped. The patient's recovery was complicated by cystitis. Union by first intention occurred in the wound until the eighth day, when vomiting, abdominal distention, and sensitiveness to pressure developed. The lower angle of the wound reopened,

and a mass of necrotic material was discharged. The patient perished on the forty-eighth day after delivery. Post-mortem examination revealed diffuse purulent peritonitis as the immediate cause of death. The child survived.

In the ninth case enchondroma of the pelvis made natural birth impossible. The patient had lost a child with the use of forceps. Cælio-hysterec-tomy was done, with a favorable result for mother and child.

The tenth case was one of inoperable carcinoma of the vagina. Here again the elastic ligature failed to control the vessels in one of the broad ligaments after the amputation of the uterus. The vessels were secured, however, and the stump closed by buried sutures. The patient made a good recovery from the operation, dying from cancer nine months afterward at her home. Her child survived.

[This array of cases in Wyder's clinic certainly helps to support his assertion that by modern surgical methods the mortality-rate for mothers is now equally low in craniotomy, symphysiotomy, and Cæsarean section; this being the case, craniotomy upon the living child is certainly not justifiable.

—ED.]

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**Gonorrhœal Endometritis Causing Premature Separation of the Placenta.**—In the *Monatsheft für Geburtshülfe und Gynäkologie*, 1896, Band 4, Heft 3, MASLOWSKY, of St. Petersburg, reports the case of a patient in her first pregnancy, who suffered from pain and hemorrhage. Her history showed that about the fourth month of pregnancy she had a discharge of an irritating nature. Her husband had had gonorrhœa seven months before marriage. The day before the hemorrhage began the patient had a very light chill, which was scarcely noticed. On examination the pregnancy was found to be in the end of the ninth month, and no evidence of placenta prævia was present. An effort was made to stop the hemorrhage by putting the patient at rest, applying ice to the abdomen, and using Viburnum prunifolium and opium suppositories. The hemorrhage gradually ceased, and on the second day the use of ice was abandoned. The pain ceased entirely upon the fourth day after treatment began. The uterus emptied itself, however, shortly afterward, a living child being born. Involution proceeded imperfectly, but the mother made a good recovery. A bacteriological examination of the placenta and the secretion from the uterus was made, and pus-cells and gonococci were found. The child developed a conjunctival catarrh without the presence of gonococci. On examining the placenta an area was found in which separation had occurred prematurely. Microscopic examination of this portion of the placenta showed the basal decidua infiltrated with nucleated round-cells, and leucocytes and abundant extravasation. The bloodvessels were engorged; the chorion and amnion were without alteration. Gonorrhœal endometritis had been present, and had caused the premature separation of a portion of the placenta.

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**Organic Heart-disease during Pregnancy and Labor.**—In the *Medical Chronicle*, October, 1896, LEA reports seven cases of heart-disease in pregnant women, with the history of labor. He calls attention to the tendency



to fatty degeneration and failure of the cardiac muscle which arises during the latter months of pregnancy, even when valvular disease is absent. If compensation is perfect before pregnancy begins, the prognosis for pregnancy and labor is good; if, however, the heart is failing, this failure will increase during pregnancy, gradually becoming worse as labor approaches. Abortion frequently occurs in these cases. Labor with these patients is very serious through engorgement and failure of the right side of the heart. A patient may even pass through labor only to fail rapidly several days afterward, probably as the result of degeneration in the heart-muscle. Mitral lesions are worst of all, because pregnancy favors the engorgement of the right heart which this condition causes. Lea reports seven cases, in four of which recovery occurred, while in three a fatal termination happened. The cases which recovered were comparatively young women in whom compensation was well established. In one, a multipara suffering from mitral regurgitation, the patient had suffered during a former labor from the effects of this complication. It was necessary to deliver the child with forceps. In the second pregnancy mitral insufficiency became prominent at five months. A second pregnancy followed two years later, and again at five months mitral insufficiency was well marked. There was also anasarca, with great breathlessness. A living child was delivered by forceps, mother and child making a good recovery. The patient recovered rapidly from her confinement.

The first fatal case was that of a primipara with a systolic mitral *bruit*. Labor was not especially difficult, the child being small, and having been dead several days. The patient's dyspnoea was so great that she could not lie down during the second stage of labor. Immediately after delivery the patient failed, and could not be resuscitated. Post-mortem examination showed the right heart much distended, and containing firm clot. The second fatal case had failing heart and albuminuria; it was that of a multipara who had suffered from chronic bronchitis. The urine was highly albuminous. Although labor was not especially difficult, the patient died on the eighth day after confinement, of heart-failure. The third fatal case was that of a multipara with greatly enlarged heart and dilated right ventricle; a large amount of albumin was found in the urine. The patient recovered sufficiently to leave the hospital three weeks after delivery, but died at her home three weeks later. Advanced mitral disease was present.

In reviewing the subject, attention is called to the fact that the induction of labor is rarely successful in these cases. The patient frequently comes into premature labor spontaneously, and is readily delivered. During labor extraction of the child should be made very gradually, and the second stage of labor should be as short as possible. Care should be taken to keep pressure upon the abdomen to prevent the rapid fall in intra-abdominal pressure when the uterus is emptied. During the third stage of labor free hemorrhage is beneficial, as tending to relieve the right side of the heart. When the heart fails at labor strychnine, digitalis, and nitrite of amyl are indicated.

## GYNECOLOGY.

UNDER THE CHARGE OF

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**Tuberculosis of the Ovaries.**—WOLFF (*Archiv für Gynäkologie*, Band lii. Heft 2) concludes an elaborate article on this subject by denying the probability of primary infection of the ovaries, since the changes in the ovisacs are so slight as compared with the advanced degeneration in other organs. He believes that there is direct infection of the peritoneal covering of the ovaries, transmitted either through the tubes, or from the pelvic peritoneum. It is, of course, impossible to exclude as an etiological factor the entrance of bacilli, carried through the bloodvessels from distant organs, though this mode of infection must be exceptional. In all the writer's cases there was no doubt as to the fact of direct infection.

The question of the transmission of tuberculosis from the mother to the fœtus through the medium of the infected ovum is an interesting one. Although it must be admitted that the development of such an ovum is arrested, it is possible that the tubercle-bacilli from an infected Graafian follicle after the rupture of the ovum may, together with the latter, enter the uterus and infect it during development of the ovum.

**Ovarian Tumors Complicating Pregnancy.**—HOHL (*Archiv für Gynäkologie*, Band lii. Heft 2) in a paper on this subject summarizes as follows:

1. During pregnancy ovariectomy should be performed during the early months if possible. Artificial abortion may be induced in cases in which the tumor is intraligamentous, or is firmly adherent, so that an operation would be difficult; puncture is not to be considered.

2. During labor the tumor should be replaced, if possible, under anæsthesia; if this does not succeed, puncture may be resorted to, with subsequent vaginal incision if necessary. In the case of solid tumors, when the child is living, Cæsarean section is indicated, followed by ovariectomy, or the latter may be postponed until the puerperium. It is not justifiable to perform ovariectomy alone during labor.

3. If performed during the puerperium, the operation should be done not later than the second week.

**Closure of the Abdominal Wound.**—In discussing this subject before the International Congress at Geneva (*Annales de Gynécologie et d'Obstétrique*, No. 9, 1896) BANTOCK offered the following conclusions: 1. Suppuration of the abdominal wound is due not to the presence of bacteria, but to foreign bodies or strangulation by tight sutures. 2. In many cases simple through-and-through sutures are sufficient. 3. In stout patients it is better to close the peritoneum separately and the remaining layers of the wound with one or

two series of sutures. 4. Silkworm-gut is the best for interrupted sutures and catgut (*not* chromicized) for buried sutures.

LE TORRE thinks that it is not sufficient to unite the fascial edges alone. The edges of the muscle should also be included in the sutures.

HOWITZ believes that just as little of the peritoneum as possible should be included; in fact, he approves of the plan of some operators not to suture the peritoneal edges at all, but to allow them to unite toward the abdominal cavity. Patients should not be allowed to leave their beds until three weeks have elapsed.

CONDAMIN recommends a tier-suture in the form of corset-lacing, especially in large wounds.

(The speakers seemed to be evenly divided in their advocacy of tier- and through-and-through sutures.)

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**Vaginal Extirpation of the Uterus.**—SCHRAMM (*Archiv für Gynäkologie*, Band lii. Heft 2) reports thirty-three cases of vaginal hysterectomy, with a mortality of 15.1 per cent. He prefers clamps to ligatures for the following reasons: 1. The operation is shorter and easier. 2. Less blood is lost and there is less risk of secondary hemorrhage. 3. In cases of carcinoma the resulting necrosis causes the destruction of the diseased tissue not removed at the time of operation. 4. Even in advanced cases the operation is free from danger. 5. The after-treatment is simpler and there are no ligatures to be removed subsequently.

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**Tuberculous Ovarian Cyst.**—EHRENDORFER (*Wiener klin. Wochenschrift*, No. 15, 1896) reports a fatal case of ovariectomy in which at the autopsy tuberculous nodules were found in the pelvic peritoneum and the adnexa on the left side. None of the other organs were affected. The inner wall of the cyst (intraligamentous) was studded with tuberculous nodules, though the corresponding Fallopian tube was healthy. It was impossible to determine whether the disease developed primarily in the ovary or was transmitted through the tube.

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**Treatment of Retrodisplacement of the Uterus.**—KUESTNER (*Ibid.*), after an exhaustive review of the statistics of various operators, using all the different methods of treatment, arrives at the following conclusions:

1. Although none of the operations for the cure of retroversion restore the uterus and adnexa to an absolutely normal position, the new relation of the pelvic organs is preferable to the former displacement.

2. A sharp distinction must be drawn between cases of movable and adherent retroversion. The adhesions must first be separated, after which the treatment in both cases is the same.

3. The abdominal cavity should not be opened for the purpose of separating adhesions unless these are too fine to permit detachment of the uterus by massage or Schultze's method.

4. Coeliotomy is preferable to anterior or posterior colpotomy, since adhesions may be more thoroughly and safely separated by the abdominal route, and, moreover, conservative operations on the adnexa can be carried out more satisfactorily.

5. The test of the value of any given method of fixing the uterus anteriorly is that it should keep the organ in a normal position, and that its functions should not be interfered with.

6. The results obtained by retro- and vagino-fixation and by Alexander's operation prove that the uterus may be maintained in a good position, but it has been shown that after vagino-fixation the functions of the organ are disturbed.

7. The latter operation should, therefore, not be performed in the case of women who are likely to conceive subsequently; in those who are not liable vagino-fixation has given excellent results, especially when supplemented by colporrhaphy.

8. When the adhesions are extensive the best operation is cœliotomy with ventro-fixation according to Olshausen's method. Conservatism should be practised as far as possible, especially in young subjects, in whom a portion of ovarian tissue should be left. If the tubes and ovaries are not seriously affected, it is sufficient merely to separate adhesions.

9. Alexander's operation is preferable in cases of movable retroversion, since it restores the uterus as nearly as possible to a normal position.

10. The indications for the operative treatment of retrodisplacement are furnished by the duration of the trouble, the negative results from the use of pessaries, and the aversion of the patient to palliative measures. A condition of the vagina which prevents the use of pessaries furnishes a positive indication.

11. Since prolapsus is generally the result of retroversion, the maintenance of the uterus in a normal position is the essential object to be aimed at. This is best attained by ventro-fixation, supplemented by plastic operations on the vagina.

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**Vaginal Extirpation of the Cancerous Uterus.**—OLSHAUSEN (*Berliner klin. Wochenschrift*, No. 23, 1896), in an address before the German Congress of Surgery, reviews the history of the operation in Germany, showing the improvement in technique and results. He considers in turn the choice of cases, preparatory treatment, technique, and after-treatment.

With regard to the choice of cases, he lays down the rule that a radical operation should not be attempted when the presence of disease in the glands or parametric tissues can be demonstrated. He believes that too many patients are subjected to operation in whom the chances of cure are practically *nil*.

With regard to the decision as to suitable cases, the old rule that the uterus must be so movable that it can be drawn down to the vulva does not now apply; the natural resistance of the healthy tissue in young subjects may prevent this. Rectal palpation furnishes the most useful information, as in this way small nodules and affected glands can be detected, even in an early stage of the disease.

In Germany during 1887 and 1888 only 28 per cent. of cases of cancer of the uterus were regarded as suitable for a radical operation, while during 1895 and 1896 the number rose to 40 per cent. The difference is attributed to the greater intelligence of general practitioners and the earlier recognition of initial symptoms.

It was formerly the custom to prepare patients for operation by preliminary curettage and cauterization of the diseased tissue, but now this is done immediately before the operation. The vagina and vulva are then thoroughly disinfected, and fresh instruments are used subsequently. After curettage it will often be found that the bladder-wall is involved, when it is better to abandon the operation. Even after the peritoneal cavity has been opened and the uterine arteries tied it is still better to stop at this point, if it is found that the disease has extended beyond the uterus. The writer's technique presents no special points of difference from that ordinarily adopted. He uses ligatures, which are cut short. The adnexa are not removed except in cases of carcinoma of the corpus uteri. After ligating the broad ligaments and removing the uterus the stumps are fixed in the angles of the wound, and when all bleeding has stopped the peritoneum and vagina are sutured with catgut and a loose tampon of iodoform-gauze is left in the vagina.

The after-treatment consists in letting the patient alone as far as possible. The tampon is removed on the second day and the woman is not touched until the end of the third week. Clamps are utterly rejected because of the danger of infection.

The writer condemns the sacral and parasacral methods of operation, since they are necessary only in cases which he regards as unsuitable for extirpation.

In 139 vaginal hysterectomies performed by him since April, 1894, there were only three deaths, while in his last 100 cases there was only one death, due to pyæmia, from which the patient was suffering before the operation.

As regards permanent results, he calls attention to the fact that German statistics are steadily improving, so that it is now possible to assert that there is hardly an organ in the body in which operations for the cure of cancer can be performed with such confident expectation of a permanent good result as in the uterus.

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## HYGIENE AND PUBLIC HEALTH.

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UNDER THE CHARGE OF

EDWARD F. WILLOUGHBY, M.D.,  
OF LONDON;

AND

CHARLES HARRINGTON, M.D.,  
INSTRUCTOR IN MATERIA MEDICA AND HYGIENE, HARVARD MEDICAL SCHOOL.

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**Anticholera Inoculation.**—DR. E. HAROLD BROWN (*Indian Medical Gazette*, July, 1896) has employed anticholera inoculation at Darbhanga with fair results. Cholera broke out in the jail, and in nine days there were nine cases. On the tenth day 172 prisoners were moved into camp twelve miles away, and 53 were left behind, and on the same day there were three new cases in the camp and another in the jail. On the following day two new cases occurred

in the camp, and arrangements were made to inoculate such as were willing to submit to the operation. All wanted it, but it was decided to inoculate but 86, and these were not picked men, all being stood in line and the alternate men chosen. Within half an hour after the operation there was pain, which steadily increased until it became very severe. Fever came on within three hours,  $102.5^{\circ}$  being about the average temperature. Before four o'clock in the afternoon every man who had been inoculated was in bed with fever. Six new cases occurred among those not inoculated, and on the following day two more from the same class, and all proved fatal. Two days afterward two cases occurred among the inoculated; both recovered. Another and last case occurred among the inoculated—a man, sixty years old, who had had diarrhoea for thirty hours before the inoculation. He died the day following. Thus, of 86 inoculated subjects three were seized and one died, and of 81 not inoculated eight were taken, and all succumbed.

Twenty-five of the prisoners left in the jail were inoculated on the day following the first operations in camp. One, an attendant in the observation-ward, was attacked and died the same day. Three days later a second case occurred which resulted fatally. In the meantime three inoculated persons were attacked and died. In all 111 were inoculated, and among them were five cases, three of which were fatal. 108 were not inoculated, and among these were eleven cases, all of which were fatal.

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**Sterilization of Public Water-supplies.**—The utter worthlessness of all domestic filters, with the exception of the Pasteur-Chamberland and the Berkefeld, which differ only in the substitution of kieselguhr, an infusorial earth, for the kaolin of which Pasteur's was made, though more recently superseded by a special blend of the clays used for the finest kinds of porcelain, has been well known to bacteriologists ever since the exhaustive examination of nearly every pattern in the market by Plagge, of Berlin, and is now generally recognized by all competent judges of the subject. Sand, vegetable or animal charcoal, spongy iron, polarite, etc., will, by intercepting suspended solid patches, render turbid waters perfectly clear; and most of these materials are able to remove a greater or less proportion of dissolved organic and even inorganic substances; but one and all are incapable of arresting the passage of bacteria, and in practice are found actually to foster their growth; the organic matter retained in the filtering-material forming a hotbed for their cultivation, their numbers being frequently far greater in the filtered than in the unfiltered water.

The purification of water in the sand-filters used for public supplies is, as Proskauer has shown, effected, not by the sand—the action of which may be described as “multiple subsidence,” the solid particles in suspension being attracted by and adhering to every face of each grain of sand so long as the movement of the water is almost imperceptible, though lifted and carried through if this be accelerated—but by the vital processes in the growth of the green, algoid film which forms on the surface of the sand, until by its density it ceases to permit the further passage of the water. It is this alone that removes dissolved matters and bacteria, reducing the number of these in the cubic centimetre from hundreds or even thousands to tens; so long as it is intact and the flow of the water does not exceed four inches (10 cms.)

per hour, the dissolved matters providing a pabulum for its growth. Pasteur's filters, on the other hand, while clean, have, like clean sand, no power of removing substances in solution, but they are absolutely impervious to even the smallest bacteria, and the filtrate is perfectly sterile. They are now everywhere adopted in bacteriological laboratories, and are, though slowly, making their way in private houses; but until recently the extreme tediousness of the process and the impossibility of securing equal impermeability in large filter-tubes have seemed to preclude the application of this method of filtration on a large scale. Messrs. Defries, the sole licensees for the United Kingdom, have, however, by an ingenious arrangement overcome the difficulty and have set up for the municipality of Darjeeling an installation capable of furnishing a supply of 150,000 gallons daily, the further increase of which will be simply a question of additional filters; and already the authorities at Peshawar and other Indian towns have ordered the same.

The "unit" of the system consists in a drum or vertical cylinder of soft cast-iron about three feet in diameter and eighteen inches in height, lined with an acid-resisting material and provided with a movable cover, held down by screwed and hinged clasps on a gutta-percha seating. Each cylinder is divided by a diaphragm into two compartments, the upper being about twice as deep as the lower and containing 150 of Pasteur's filter-tubes, held mouth downward by thick India-rubber collars in as many circular apertures in the diaphragm. The upper apartment has an inlet for the unfiltered water and an outlet or drain open only when the filters are being cleaned, while the lower has an outlet for the filtered water, and each has a small pipe with a stopcock; the lower for pumping in air for the purpose of testing the filters, and the upper for injecting the acidulated water used in cleaning.

The inlets and outlets are provided with gun-metal valves and communicate with three mains for the unfiltered water, the filtered and the waste or washings respectively, which are provided with sluices of the ordinary kind used in water-works and are distinguished by being painted in different colors. Pasteur's filters, from their peculiar nature, act efficiently under any degree of pressure, whether the water pass from within outward or *vice versa*. In these the unfiltered water is admitted into the upper compartments under a head at Darjiling of sixty-five feet or twenty-eight pounds (equals two atmospheres) to the square inch, passing through the filter-tubes into the lower, whence it flows into the mains; and the thirty-eight cells or cylinders of which this installation consists are capable of supplying 150,000 gallons of perfectly sterilized water, which might be increased indefinitely by merely adding to their number. As a single defective tube would destroy the efficiency of the filters, they are tested in the first instance, and subsequently at intervals by a method based on a remarkable property of the material of which they are composed, viz., that though they are freely permeable by water, they when wet resist the passage of air through their pores, even under a pressure of one and a half atmospheres. This is done by pumping air into the lower compartments, from which the water has been run off through the small pipe attached thereto, the valve of the inlet being closed to remove the pressure in the opposite direction, when, if the pressure-gauge remains stationary at the given pressure, the filters may be considered perfect; should the gauge, on the other hand, indicate, by sinking, the existence

of any escape, the covers are raised, when the defective tube is detected by the appearance of minute bubbles of air at the site of the flaw.

For cleaning the filter a 10 per cent. solution of hydrochloric acid is injected into the upper chamber under pressure, which forces it into and through the filter-tubes, dissolving the solids and earthy salts that had been arrested in their substance, the external coatings being afterward removed by a brush and then washed down the drain by a stream of unfiltered water.

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**Examination of Well-waters.**—DR. R. W. D. MACMARTIN CAMERON, M.O.H. for Galloway, has called attention to the risk of unmerited condemnation incurred by prematurely analyzing the water of a newly constructed well.

Again and again has he found that the first samples showed percentages of ammonia and albuminoid ammonia, which it would have been impossible to pass, while two or three months later these had fallen to one-sixth or one-eighth of the former amount. He attributes this to the fouling of the well by the urine, expectoration, etc., of the men employed in its excavation. For example, 0.54 part of free and 0.22 of albuminoid ammonia per million were found in the water of a well sunk in an ideal position at the foot of a hillside, in a clean, dry pasture; but two months later the proportions were *nil* and 0.09 respectively. In none of the analyses made after the lapse of two months only was there any such enormous reduction in the chlorine; but Dr. Cameron maintains, as the result of numerous observations, that in such casual pollution of the soil around a well, the chlorides are the last of the urinary products to enter the well and the last to disappear after the contamination has ceased.

It is the practice or fashion now to disparage shallow wells, as being *de facto* and inevitably liable to pollution; but we know enough of the distribution and functions of the nitrifying bacteria in the upper layers of the soil to see that if by a proper kerb, cover, etc., storm-waters and surface-filth are excluded, all legitimate additions of manure and other organic matters to the surrounding surface-soil will be completely mineralized long before they can reach the ground-water. It would be impossible, if it were desirable, to abolish shallow wells; but there is no excuse for the retention of that abomination, the cesspit, which by discharging, through leakage or otherwise, putrid liquids into the earth at a depth below the bacterial or "living" zone, is the cause of the pollution not only of most shallow, but of many deep wells, since no amount of percolation through the "dead" earth suffices for real purification. The "living" earth is the best of all possible filters, and with the abolition of cesspits, the direct application of excreta to the soil, and the discontinuance of the practice of accumulating dung in heaps till the adjacent and underlying soil is supersaturated with reeking filth, a properly constructed well, even of but six or eight feet in depth, should be practically free from the least risk.

Wells are indeed the natural sources of water for human use, and it is only human perversity that has marred their fair fame.

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**Post-scarlatinal Diphtheria.**—The present state of bacteriological science forbidding us to assume either the spontaneous origin of a case of specific



infectious disease or the transformation of one specific disease into another, the medical officers of the Metropolitan Asylum Board's (Fever) Hospital have been much concerned with the problem of post-scarlatinal diphtheria; that is, of unmistakable diphtheria appearing in a patient convalescing from scarlatina, and in many instances at a period which would suggest or necessitate the occurrence of the infection within the hospital itself, a suspicion that apparently derives support from the great increase in the number of these cases that followed the admission of cases of primary diphtheria into the hospitals of the Board.

Year.	No. of cases of scarlatina.	No. of cases of post-scarlatinal diphtheria.	Incidence, per cent.	No. of diphtheria cases admitted.
1886 . . . . .	1,559	7	0.4	.....
1887 . . . . .	4,342	18	0.4	.....
1888 . . . . .	5,717	67	1.1	99
1889 . . . . .	3,730	102	2.7	722
1890 . . . . .	6,439	158	2.4	942
1891 . . . . .	5,442	97	1.7	1312
1892 . . . . .	11,333	211	1.8	2009
1893 . . . . .	14,832	207	1.3	2848
1894 . . . . .	12,636	210	1.6	3666

But this explanation will not bear examination; there had been such cases in the hospitals before the admission of diphtheria, and the opening of these institutions was in consequence of the enormously increased prevalence of diphtheria in the metropolis.

Notification did not come into force until 1890, but the deaths from diphtheria registered in London having risen from 0.09 per 1000 of population in 1877 to 0.23 in 1887, rose suddenly in 1888 to 0.30, and the attack-rate among scarlatinal children in hospitals since 1890 has in fact been not much higher than that among previously healthy children outside. Besides, in the N. E. Hospital, to which no cases of diphtheria are admitted, the wards being devoted to scarlatina exclusively, the incidence of post-scarlatinal diphtheria exhibited an identical and simultaneous rise for the years 1893, 1894, and 1895 (the hospital having been opened in 1892 only) of 0.4, 0.8, and 1.6 per cent. The increase in the number of cases of scarlatina admitted in the hospitals is no doubt due not so much to the fact of the greater prevalence of the disease in London, as to the legal removal of the stigma of pauperism formerly attaching to these institutions, with the civil disabilities it involved, which deterred respectable workingmen and tradesmen from availing themselves of them, of a growing appreciation of the advantages of hospital treatment and of the removal of first cases among the public generally, and to the passing of the Notification Act, which has led to the recognition of cases which might have escaped or evaded observation. Dr. Goodall, of the Eastern Hospital, one of our highest authorities on diphtheria, primary and secondary, is convinced that these post-scarlatinal cases differ in their nature and origin in no way from primary cases, but can invariably be referred to the presence of the Löffler bacillus in the throats of the individual patients or of other members of the family, and in some few instances of the nurses in attendance; these pre-existing cases having the

appearance of ordinary sore-throats, and in the absence of bacteriological examinations not being recognized as diphtheritic; indeed, we know from actual observations that the bacilli are often present without giving rise to any symptoms whatever. The figures for his own hospital for the five years 1891-1895 are as follows:

Year.	No. of cases of scarlatina.	No. of cases of diphtheria (mostly post-scarlatinal).	Deaths from diphtheria.	Percentage incidence of diphtheria.	Case-mortality of the diphtheria cases.
1891 . .	1413	28	18	1.9	64.2
1892 . .	2902	17	9	0.5	52.9
1893 . .	2018	10	6	0.4	60.0
1894 . .	1647	14	6	0.8	42.3
1895 . .	1517	68	17	4.4	25.0

Of the 17 deaths in 1895 no fewer than 9 were due not so much to the secondary diphtheria as to some complication of the antecedent scarlatina, and would probably have ended fatally, though diphtheria had not supervened; but even including these the death-rate of 25 per cent. is less than half the mean of the preceding four years, which was 55 per cent., and this he rightly ascribes to the employment of the antitoxin treatment, which he was the first to adopt in the hospitals of the Board.

We may here refer to the observations of Dr. Caiger, another of the Board's superintendent medical officers, on the relative danger of fevers supervening on others, viz., that the mortality of such secondary attacks is far greater when the preceding disease has been one attacking the same mucous membranes or other tissues; thus variella, usually a trifling affection, assumes, when following scarlatina or measles, the characters of smallpox, and, though post-scarlatinal is graver than primary diphtheria, an attack of diphtheria following measles is most likely to be fatal, since it finds not only the throat, but the bronchi themselves in a highly congested and susceptible condition, and is apt to involve by extension the entire respiratory tract.

**The Differentiation of the Bacillus of Enteric Fever (Eberth's) from the B. Coli Communis, etc., and of Koch's Cholera-bacillus from Others of Like Morphological Character.**—DR. KLEIN, in his Harben lectures, delivered this summer at King's College, London, expressed his belief that, on the one hand, in the majority of cases in which the presence of the typhoid bacillus had been alleged, the organism actually observed had been merely the B. coli; and, on the other, that little reliance could be placed on its assumed absence, since even when its presence was certain, from the proved admixture of enteric evacuations, it might easily elude detection.

The B. coli is, strictly speaking, positive evidence of fecal contamination direct or indirect, being always derived originally from the intestine of man or beast, but not of such pollution in the grosser sense that is commonly suggested by the expression. In towns and populous districts it is ubiquitous, being present in earth, air, and water, in food and drink, and even in the saliva and sweat. But it is not found on mountains and moors, and so far from its ubiquity elsewhere negating the theory of its origin, it simply

means that the air and water are nowhere absolutely free from some slight taint.

It is the chief cause of the souring and curdling of milk, which, though sterile so long as it is in the udder, becomes inoculated in the act of milking; while milk, being the richest of culture-media, that sold in the shops teems with the bacilli by myriads in the cubic centimetre.

It was, Dr. Klein said, absolutely distinguishable from Eberth's bacillus by:

1. Its power of coagulating milk, this being due to the formation of special ferment, and not to the acid which is generated equally by Eberth's bacillus, as shown by the cultivation of either in gelatin tinted with blue litmus.

2. The evolution of gas, forming large bubbles in a solid gelatin-culture.

3. By the production of indol in broth-cultures kept at a temperature of 37° C., indicated by the deep red color following the addition of a few drops of *commercial* nitric acid, this being in fact the source of the indol which is a normal constituent of the contents of the intestine. None of these properties is possessed by Eberth's bacillus, which is more slender, growing far less rapidly, and, under special staining-methods, showing numerous flagelli, the *B. coli* having few or none. The bubbles beautifully seen in stab-cultures are by themselves conclusive.

The detection of the bacillus of typhoid fever is extremely difficult; even in the undiluted sewage of a wing of a hospital in which were forty typhoid patients it was demonstrable in a minority only of the preparations; and though the epidemic of Worthing was indisputably due to a contaminated water-supply, none was found in 2500 c.cm. taken from the mains and only a few in 1200 c.cm. from the well itself; and the results were little better when he inoculated with pure cultures of the typhoid bacillus cultures and fluids containing *B. coli*, etc.

The examination of sewage-organisms may be greatly facilitated by making cultures in gelatin with 300 to 400 per cent. of phenol, which eliminates all but the *B. coli*, Eberth's, *Proteus Zankeri*, and perhaps one or two more; but under all circumstances the *B. coli*, originally the more numerous, multiplies with such rapidity as to crowd out wholly the more delicate organisms of typhoid. Yet the presence of a large number of the former shows such fecal pollution as to render specific contamination possible at any moment and in this lies their chief significance.

A like difficulty, or rather danger, attends the differentiation of Koch's bacillus of cholera from Finkler's, which is present in the diarrhœas often miscalled cholera nostras, etc., if the examination be conducted in a perfunctory manner.

The most characteristic appearance of Koch's bacilli is that of chains of commas or pairs, giving the form of an S, in the flocculi of the rice-water evacuations. From these flocculi cultures are made in water with 1 per cent. of pepsin and 0.5 per cent. of common salt. Subcultures made by a stab in gelatin are easily recognized by the more rapid liquefaction of the gelatin by Finkler's, which gives a jelly-bag appearance to the track, that following a stab of Koch's presenting the appearance of a string of beads.

This distinction, depending on the different rates of growth, is analogous to that observed in the case of the *B. coli* and Eberth's, though the effect is in the one instance evolution of gas and in the other liquefaction of the

gelatin. To detect cholera-bacilli in water, 500 c.cm. should be mixed with a 10 per cent. solution of pepsin and 5 per cent. of salt, in such proportions that the mixture contains 1 per cent. of pepsin and 0.5 per cent. of salt.

Fluid cultures treated with a few drops of sulphuric acid absolutely free from nitrates give an indol reaction—*i. e.*, a deep red color.

**Mortality from Tuberculosis in German Cities.**—DR. BOLLINGER (Dr. C. W. Chancellor, in *Sanitarian*, April, 1896), comparing the mortality-tables of various German cities extending over long periods, finds that in the large cities a distinct diminution in the death-rate from tuberculosis is taking place. In Munich, for example, a diminution of 18 per 10,000 has occurred during the last twenty-six years. The tuberculous material in the Pathological Institute, it is said, has diminished so that in the space of five years 8 per cent. fewer cases of tubercle are met with on the post-mortem table; formerly a third of all post-mortem examinations were on subjects that had died from tuberculosis in some form, where they now number only a fourth. He states also that in 1893-'94 a remarkable increase in tuberculosis took place in Schwerin, and this increase corresponded with a dearth of fodder, illustrating the effects of deficient nutrition in predisposing to disease.

**Milk as an Aid in the Conveyance of Disease.**—DR. R. G. FREEMAN (*Medical Record*, March 28, 1896) has collected and tabulated fifty-three epidemics of typhoid fever attributed to milk, twenty-six of scarlatina, eleven of diphtheria, two of foot-and-mouth disease, three of throat affection, two of acute poisoning, and one of cholera asiatica, all occurring since 1880, and including none of those tabulated by Hart in 1881. As an aid in the consideration of the manner in which milk may become infected, Dr. Freeman prepared three plates of equal size (three and a half inches in diameter) and exposed them for the same length of time (two minutes), one in the open air, one inside a barn, and the third under a cow being milked in the same barn, the plate being held just in front of the milk-pail. Six colonies developed on the first, 111 on the second, and 1800 on the third. Such a number of bacteria falling on so small a surface in so short a time indicates that an enormous number may fall into a milk-pail during the time required for a complete milking. These bacteria fall from the belly of the cow, from the clothes of the milker, and from his hands as well. Contamination may be by impure water used in washing the utensils or in cooling the milk, or, again, as an adulterant. Whatever bacteria are present in milk after the first handling have ample opportunity to multiply before the milk is consumed, since milk is usually over thirty-six hours old when it is delivered to the purchaser. Ordinary New York milk often contains from a hundred to several millions of bacteria in each drop. Dr. Freeman divides the diseases which it is believed may be conveyed by milk into three classes: 1. Those in which the pathogenic micro-organisms which are introduced into the milk are conveyed from the body of the cow, as tuberculosis, anthrax, foot-and-mouth disease, and acute enteritis. 2. Those in which the pathogenic micro-organisms are introduced from some other source during or after milking, as cholera, typhoid, scarlet fever, and diphtheria. 3. Those caused by milk containing poisonous agents developed by bacterial growth. The

disease-germs emanating from the cow may be within the udder, or the contamination may occur during milking by the dropping of particles of fecal matter from the cow, or they may come from the dust of the barn containing dried particles of fecal matter or saliva of the cow. Epidemics due to milk have certain characteristics. The cases appear suddenly, many new cases each day, and the subsidence is equally marked a few days after stopping the harmful milk-supply. The houses invaded are often widely distributed and not restricted to some particular part of the town. The houses of the rich are apt to be more seriously invaded than those of the poor, because the poor, as a rule, use little milk. The houses invaded often have the best hygienic surroundings. The special milk-drinkers in each family are most liable to become affected. In more than half of the epidemics cases of the diseases have occurred among the handlers of the milk prior to the outbreak. A study of the reported epidemics teaches that in cases of communicable infectious diseases inquiry should be made into the source of the milk-supply; milk-traffic should be separated from houses where people live; the dairy should be at least 100 feet away from the house, barn, or privy, and on a higher level, and should have a pure water-supply of its own; nobody should be allowed to enter the barn or dairy or handle the milk who has come in contact with a sick person, the sickness not being positively known to be non-contagious; all persons connected with the milk-traffic should be required to notify the authorities on the outbreak of any disease in their respective abodes, and to abstain from their work until permission to resume is given by the authorities notified; cities should accept milk only from dairies regularly inspected, and where all the cows have been proved by the tuberculin-test to be free from tuberculosis; all tuberculous cows should be killed, and the premises where they have been kept should be thoroughly disinfected; milk should not be kept for sale or stored in any room used for sleeping or domestic purposes or opening into the same.

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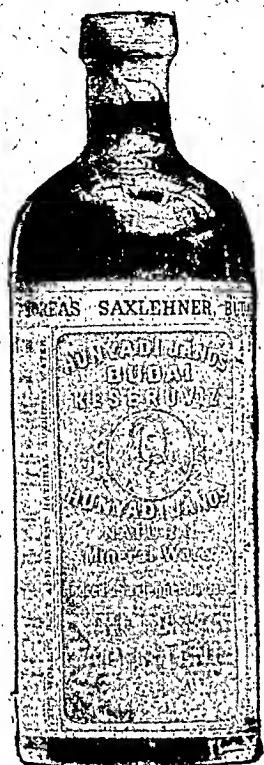
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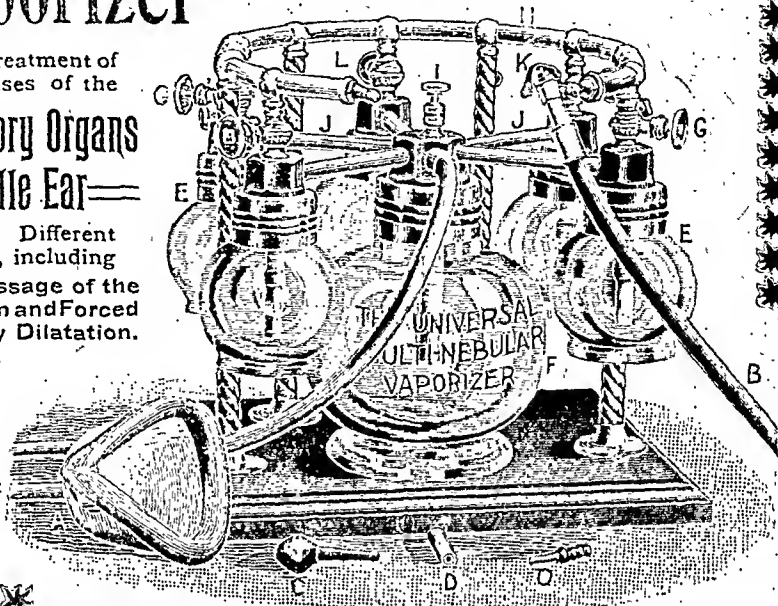
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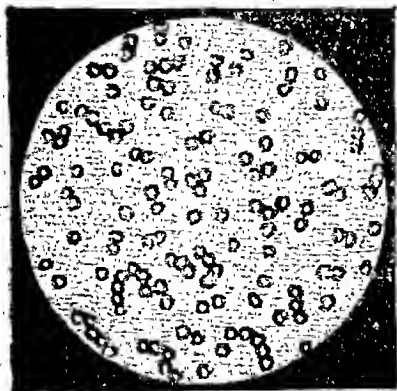
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In the *British Medical Journal* (Dec. 28, 1895) Dr. Alexander Haig says that the failure to comprehend the invariable connection between the precipitation of uric acid into the tissues on the one hand, and a rheumatic or gouty inflammation of those tissues, on the other hand, is as much due to preconceived ideas and ignorance of the chemistry of uric acid as was the ancients' ignorance of the earth's motion and of the circulation of the blood. He makes bold to say that every drug that has ever been used with benefit in acute rheumatism in the past and every drug still to be discovered that may be used with benefit in the future will be found to do good *in direct proportion to its power of dissolving and eliminating uric acid*. Once these simple facts about the causation of rheumatism are generally recognized, he adds, its prevention will be so simple and so certain that the disease will become quite a rare one.

Salts of lithium have long been considered most suitable for eliminating uric acid, but their solvent action largely depends on the form in which they are administered. Lithium carbonate is almost useless, inasmuch as in the stomach it is converted into lithium chloride, which of all the lithium salts is the least able to combine with uric acid, and, moreover, is only absorbed to a limited extent. In this connection it may be pointed out that in the so-called natural lithia waters, the lithium is always found in solution as chloride or sulphate, both of which salts have practically no solvent action on uric acid. The benefit derived from these waters in some cases must be due solely to the large amount of water consumed. Alkaline treatment is not to be recommended. There is no necessity for rendering the urine alkaline, and there is even no objection to its remaining slightly acid (von Noorden). It is important, however, to restore the normal alkalinity of the blood and to keep the uric acid in solution in the urine. The best means of doing this is by the administration of vegetable acids or acid salts. If the vegetable acid be combined with lithium, a salt can be obtained which will restore the alkalinity of the blood and at the same time eliminate uric acid and retain it in solution in the urine.

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In this connection Dr. Haig has shown that certain drugs diminish the solvent power of the blood for uric acid, and among them are potassium citrate, ammonia, lactic acid, arsenic and digitalis. It should be noted that ammonium urate is one of the most insoluble salts of uric acid.

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ON CERTAIN FEATURES IN THE PROGNOSIS OF PNEUMONIA.

BY WILLIAM OSLER, M.D.,  
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THE higher the mortality the more difficult is it to estimate in any disease the value of the various elements of prognosis. Pneumonia is certainly the most fatal of the acute infections of adults in temperate climates. No other disease kills from one-fourth to one-third of all persons attacked. Very elaborate statistics have been collected showing the death-rate of the disease. These have been grouped together by Wells,<sup>1</sup> of Chicago, in one of his excellent papers on pneumonia. Of 233,730 cases the mortality was 18.1 per cent.

Unfortunately it is chiefly from hospitals that we have to gather our facts. S. H. Dickson, whose essay on "Pneumonia" is a storehouse of valuable information, comments on "the remarkable equality of this proportional mortality in peace and all comfort, in hospitals of wealthy communities, in the field of destructive war, and in hospitals and barracks the emphatic seats of destitution, privation, exposure, and neglect."

A few years ago I collected the statistics of mortality from some of the leading hospitals of this country. In the Montreal General Hospital the death-rate was 20.4 per cent.; at the Charité Hospital, New Orleans, 38 per cent.; at the Pennsylvania Hospital, Philadelphia, 29.1 per cent.; at the Boston City Hospital, 29.1 per cent.; at the Massachusetts General Hospital, 25 per cent. These figures are very much the same as those in the large English hospitals, given recently

<sup>1</sup> Journal of the American Medical Association, 1892.

by Dr. Lecch.<sup>1</sup> Thus at St. Thomas's for eleven years the mortality was 20 per cent.; at St. Bartholomew's Hospital for fifteen years the mortality was 18.6 per cent.; at the Edinburgh Royal Infirmary, 27.1 per cent.; at the Manchester Royal Infirmary, 28.8 per cent.

Of the first 124 cases of croupous pneumonia admitted to or developing in the Johns Hopkins Hospital, 37 died, a mortality of 29.8 per cent.

The mortality in private practice, though high, does not reach the figures which I have just given. The only large statistics available on this point are those in the "Report of the Collective Investigation Committee of the British Medical Association," which was drawn chiefly from private practice. The mortality was only 12 per cent. I wish there could be a collective investigation on this point from the practices of eight or ten of the leading family physicians in New York, Philadelphia, Boston, and Baltimore. I feel sure that the figures in adults would show a very high death-rate. It would scarcely be fair to ask consultants to speak of their figures, as they see only the more severe forms. I should say the mortality among the cases which I see with physicians is at least 50 per cent.

Among the circumstances influencing the prognosis some are general, as age, race, and habits; others special, as the degree of involvement of the lung, the fever, complications, etc.

Age is a very important factor. As Sturges remarks, the old are likely to die, the young to recover. Series of cases are quoted in Wells's paper in which the mortality in children has ranged from 1.9 to only 3.3 per cent. On the other hand, above sixty years of age the death-rate is very high, reaching 50 to 60, or even 80 per cent. So fatal is it that to die of pneumonia in this country is said to be the natural end of elderly people.

The disease appears to be much more fatal in the negro than in the white. The very high rate of mortality from the disease in the South is stated to be due to this cause, but of the first 124 cases at the Johns Hopkins Hospital 23 were in colored patients, with 6 deaths, a mortality of 26 per cent., against 101 whites, with 31 deaths, a mortality of 30.6 per cent.

Previous habits of life and the condition of bodily health at the time of the attack form the most important factors in the prognosis of pneumonia. In analyzing a series of fatal cases one is very much impressed with the number of cases in which the organs show signs of degeneration. In 25 of my 100 autopsies at the Montreal General Hospital the kidneys showed extensive interstitial changes. Individuals debilitated from sickness or poor food, hard drinkers, and that large class of hospital patients, composed of robust-looking laborers

<sup>1</sup> Medical Chronicle, September, 1894.

between the ages of forty-five and sixty, whose organs show signs of wear and tear, and who have by excesses in alcohol weakened the reserve power, fall an easy prey to the disease. Very few fatal cases occur in robust, healthy adults. Some of the statistics given by army surgeons show better than any others the low mortality from pneumonia in healthy picked men. The death-rate in the German army in over 40,000 cases was only 3.6 per cent.

Apart from certain complications the fatal event in pneumonia may result from a gradual toxæmia, or from mechanical interference with the respiration and circulation.

The toxæmia is the important element in the disorder, to which in the majority of cases the degree of pyrexia and the consolidation are entirely subsidiary. The poisonous features may develop early and cause from the outset severe cerebral symptoms, and they are not necessarily proportionate to the degree of lung involved. There may be severe and fatal toxæmia with consolidation of only one-half a lobe, while a patient with complete solidification of one lobe or of a whole lung may from beginning to close of the attack have no delirium. Many of the cases which show the most profound toxæmia present variations from the typical picture; thus there may be no cough, no expectoration, very slight fever, and no leucocytosis. In the following cases the clinical features were rather those of a profound intoxication than of any local disorder:

*Pneumonia beginning with very acute delirium simulating insanity.* November 7th, 8.15 p.m., I was sent for to see E. H., aged twenty-eight years, a large, able-bodied man, who had been brought by his family from Pittsburg, Pa., where he had been in the West Penn Hospital for eight days. He had been in Chicago at the World's Fair and had seemed quite well. He left Chicago on Monday evening, October 30th. On the train he was noticed to be behaving strangely, and had delusions that there were numerous train-robbers, and that there were a number of persons following him. His conduct disturbed the passengers so much that at Pittsburg he was taken in a patrol-wagon to the West Penn Hospital. There he became actively delirious, and was placed in a strait-jacket, after having made a futile attempt to cut his throat. He was evidently very ill, though he had no cough, and there was not much fever, though he complained a good deal of pain in the side. His relatives removed him yesterday. He stood the journey well. When I saw him he seemed rational; respirations were very hurried, 55 to the minute. The color was bad; the pulse was 120, and feeble. He had just been carried up and was in a condition of a good deal of excitement. He told a very pitiful story of his capture, as he called it, at Pittsburg, and how the people had conspired to put him in the hospital. The temperature was 99.5°. It really seemed as if the condition was some form of acute insanity, which opinion was strengthened, of course, by the fact that on a former occasion he had had some slight mental aberration. He begged me not to examine the chest, as he was quite exhausted.

8th. The patient had a fairly good night; morning temperature was 100.2°, pulse 128; the finger-tips a little cyanosed. Examination of the chest revealed to my surprise almost complete consolidation of the left lung, with dry, intense tubular breathing. The only resonance was in the infraclavicular region, where the note was Skodaic in character. He was very much quieter, the delirium had entirely disappeared, and he took his medicine and food well. He complained of a great deal of pain, and he had a quarter of a grain of morphine at night. He was given whiskey and Dover's powder.

9th. The patient seemed to be doing fairly well. There was no delirium. The temperature in the morning was a little over 100°, and in the evening 101.2°, the first time that it had registered above 101°. The lung was completely consolidated to the top; intense blowing breathing everywhere. He had no cough, and no expectoration. The pulse was a little more rapid in the evening, 130; respirations at 60. The tongue was not dry, and in the evening he expressed himself as feeling more comfortable.

10th. This morning, at 8.15, the temperature was 99.5°; the pulse 118, and of rather better volume. He had dozed at intervals through the night, but not having as much sleep as he wished, and he still complained of a good deal of pain. He seemed, however, quite rational. He had taken his food very well. There was no cough. The color of the lips was good; that of the finger-nails a little livid. Respirations 60 per minute. He had not taken the ammonia during the night, and he was ordered full doses of strychnine. His condition, on the whole, though still critical, seemed more comfortable, and he said that the pain was much less. About eleven o'clock he became a little more delirious, the nurse was called, and he was found perspiring profusely, and had become very cyanosed. The respirations became more rapid, he became unconscious, and within a little more than an hour from the onset of the serious symptoms death took place.

*Toxic pneumonia, without cough, expectoration, or high fever.* Mr. G., aged about sixty-six years, seen February 8, 1894, with Dr. Alan P. Smith. The patient was a very vigorous, healthy man, who, during the winter, had been somewhat overworked. On the evening of February 3d he attended a concert at the Peabody Institute, which was rather long, and he complained a good deal of being tired. On Sunday, February 4th, he did not take his breakfast as usual, and toward the middle of the day he had a chill, not, however, of long duration or of great severity. He complained of a good deal of pain in the back and aching in the joints and in the legs, so that it was regarded as possibly a case of influenza. He had no cough, no shortness of breath, and the fever was very moderate. He had pain across the lower part of the back, which was exaggerated on deep inspiration.

On Tuesday and Wednesday he was weak and prostrated, complaining a good deal of the muscular pains. The temperature was not above 100.5°; the pulse was good; there was neither cough nor expectoration. The lungs were examined, but no changes were found. He seemed, however, very ill, and he had occasionally a little wandering.

On the morning of Thursday, the 8th, Dr. Smith discovered dullness at the base of the right lung. Throughout the day he became much worse, more delirious, and the pulse feebler. When I saw him late in the afternoon the pulse was 132, the beats irregular in volume and intermittent. The heart-sounds were clear, but had a somewhat foetal

rhythm. The skin was moist and he was sweating profusely. The tongue was dry. He had been wandering a good deal, but he talked to me rationally. The lungs were clear in front; behind over the middle of the scapula there was flatness which extended as far as the posterior axillary fold, with tubular breathing and numerous râles. There were no râles at the base of the other lung, and the respirations were only 28. There was not, nor had there been, any respiratory distress.

The abdomen was not distended, the spleen not enlarged. There had been from the start neither cough, nor expectoration, nor had there been any special dyspnoea. The patient had had an objection to stimulants, but he was ordered at once whiskey and brandy in full doses, ammonia, and for twenty-four hours moderate doses of digitalis.

Throughout the night his condition improved materially and on the morning of the 9th the pulse was 98, regular, full, and of fair tension.

He had had some delirium, but seemed altogether better, and he had taken his nourishment and stimulants well. The temperature was 100.5°. In the evening he did not seem quite so well; the temperature rose to 101.8°, the highest point it had reached; the pulse was more rapid; he had had more delirium; the tongue was dry; and he looked badly; still no cough, no expectoration. The consolidation had extended a little further into the axilla.

10th. Patient had a bad night, and had refused to take his food. The pulse had again become very rapid and irregular, and he seemed much more prostrated. Dr. Smith stayed the night with him, as he would only take the medicines from him. The pulse this morning is better, 116, of good volume, but occasionally drops a beat. He is rather drowsy, the respirations are 32, tongue dry, and he looks like a man in a condition of profound toxæmia. He sank gradually and died in the evening.

These two cases illustrate a type of pneumonia in which the general toxic symptoms overshadow entirely the local and more usual features of the disorder. These severer types are seen particularly in the epidemic form and in old people, and the toxæmia may be out of all proportion to the local disease.

Probably, too, the sudden and unexpected death in pneumonia may be attributed to the action of the specific toxins on the heart-centres, rather than on the muscular substance of the organ itself. This seems more reasonable than the former idea that it was the action of the high fever upon the myocardium. These cases are by no means uncommon, and one has always to be on the lookout. I have notes of three cases which I have seen within the past few years. In the first, massive pneumonia with great obscuration of the physical signs, owing to blocking of the bronchial tubes, death occurred quite unexpectedly on the sixth day; in the second, death occurred suddenly on the fourth day; and in the third case the patient died in collapse on the third day.

*Massive pneumonia; death on the sixth day.* Benjamin M., aged thirty-eight years, colored, hod-carrier, was admitted December 14, 1894, complaining of pain in the right side of the chest and cough.



He had been strong and well, with the exception of rheumatism at twenty-five years; he had a chancre in 1884.

On December 5th he caught cold, but kept at work for the two following days; on Monday, the 10th, he had a headache, and while still in bed was seized with severe pain in the right chest, followed almost immediately by a severe chill. The pain, which was sharp and stabbing, grew steadily worse and was aggravated by coughing. The expectoration was profuse. He had been in bed since the onset of the pain.

On admission the temperature was  $104^{\circ}$ , the pulse 130, the respirations 40. He was a large, powerfully built man, propped up in bed on his back; respirations shallow; no marked cyanosis. The mind was clear. Pulse was full, bounding, and slightly dicrotic; the tension was low. The expiration was interrupted by a slight jerking cough. The percussion-sound on the right side of the chest in front was clear to the fourth rib; below this and over the left back it was dull. There was a distinct friction-rub heard in the right axilla and at the base. The breathing was nowhere typically tubular, but in the infrascapular space behind there was modified bronchial breathing. After coughing a few moist râles were heard. Tactile fremitus was present; the voice-sounds were nasal. The other lung was clear. The leucocytes were 10,200 per c.cm. The sputum was viscid, slightly rusty.

15th. The temperature kept uniformly between  $103^{\circ}$  and  $104^{\circ}$ ; he was delirious; the pulse was about 120, respirations 48 to 50. The cough was very frequent and distressing. There was a tympanitic note at the right apex, shading into dullness, which extended over the whole of the rest of the lung. The friction-rub was loud in the axilla, where the respiration was distinctly tubular. At the base the breathing was feeble, and distinct tubular breath-sounds could be heard, except at one small spot just below the angle of the scapula. On the left side the breath-sounds were clear, with the exception of a few fine râles at the end of inspiration. The patient seemed to be doing very well. The leucocytes sank on the 15th to 6000 per c.cm. There was albumin in the urine in considerable amount, and a large number of granular casts.

On the morning of the 16th, at 8 o'clock, there were urgent dyspnoea, great rapidity of the heart's action, and liquid râles everywhere over the left lung and in front upper lobe of the right lung. He sank and died in a few hours.

*Abstract of Autopsy* (No. 602). Anatomical diagnosis: massive pneumonia affecting right lung; occlusion of bronchus (by fibrinous plug) going to the lower lobe; acute serofibrinous pleurisy; fresh patch of pneumonia in left lung; general pneumococcus-infection.

The right lung, with the exception of the anterior edge, extending backward a quarter of extent of the entire lung and the apex, was consolidated. The solidified portions were granular, reddish; the apex much œdematous. The main bronchus going to the lower lobe of the lung was filled with a fibrinous plug which completely obliterated the lumen. The pleura was covered with a fibrinous exudate.

In the left lung there was a small area of consolidation in the lower lobe. There was no endocarditis. The heart-flesh was friable. The kidneys looked a little swollen and the cortices were coarse. Cultures from the organs and from the blood of the heart showed colonies of the micrococcus lanceolatus.

In the following case death occurred suddenly on the fourth day :

*Lobar pneumonia ; sudden death on fourth day.* A. P., aged twenty-two years, colored, driver, admitted May 21, 1894, complaining of cough.

The family and personal history was very good.

Three weeks ago he was struck on the back of the ear with a glass bottle. The wound bled profusely. A week later he had fever and headache, and was cupped on the back of the neck.

He was seen at the dispensary two days ago, at which time he had no fever, and the examination was negative.

Yesterday, the 20th, about 6 P.M., he had a shaking chill, followed by fever and a sharp pain in the left side. The pain was very severe through the night, and was much worse when he drew a deep breath. He had a cough with blood-tinged expectoration.

The temperature on admission was  $103^{\circ}$  and rose at 2 P.M. to  $104^{\circ}$ ; the respirations were 56 and shallow; the pulse 128, soft, full, and regular.

The examination showed dulness in the lower lobe of the left lung, with distant but not distinctly tubular breathing. The heart-sounds were clear. The sputum was rusty and contained numerous diplococci. There were albumin in the urine and a few granular and hyaline casts. The leucocytes on the 21st were 50,000. He was ordered ice-poultices and Dover's powder at night.

22d. The temperature had been remarkably uniform, scarcely varying half a degree from  $104^{\circ}$ . The signs of consolidation in the lower lobe of the left lung were more marked. The heart-sounds were clear; the first a little reduplicated, and the second pulmonic was accentuated. There was a soft, systolic murmur in the pulmonary area. The spleen was not palpable. The urine was a little smoky, and a few blood-cells were seen, but no tube-casts. The sputum was mucopurulent. The leucocytes were 20,000 per c.cm.

On the 23d the temperature had risen nearly to  $105^{\circ}$ ; the pulse was 116, regular. At the time of the morning visit he seemed doing very well. On the evening before, he had an attack of hiccough and had been very restless. The mind was clear, and there did not appear to be any extension of the local condition. I noted, however, that Skoda's resonance was very marked at the apex in front. He had been taking small quantities of whiskey and aromatic spirits of ammonia. In the evening, without any warning, or without any special aggravation of his symptoms, the nurse noticed that he was gasping for breath, and in a few moments he died before the house-physician could be summoned.

*Abstract of Autopsy* (No. 521). Anatomical diagnosis: croupous pneumonia; acute nephritis; fatty degeneration of heart-muscle.

The left lung was voluminous; the pleura of the lower lobe was covered with fibrin. The lower lobe was consolidated throughout, finely granular, and on section grayish-red in color. The upper lobe was also consolidated, particularly in the anterior half.

The right lung was voluminous; the upper and lower lobes emphysematous. The lower lobe is slightly granular, on section red, and in a condition of beginning hepatization. The heart-muscle showed microscopically much fat. The kidneys were swollen, mottled on the surface, and microscopically showed signs of acute nephritis.

Quite serious collapse-symptoms may occur early in the disease, even within twenty-four hours. The following is one of the most striking

cases I have seen, in which the patient had three attacks of cardiac syncope, the last of which proved fatal on the third day of the disease. I give the notes just as I dictated them to my secretary on returning from the consultation :

*Pneumonia; fatal collapse on the third day.* June 27, 1893, 12.45 A.M., I saw, with Dr. King, Mrs. S., aged forty-four years, a healthy, well-nourished woman, who had a severe chill on Saturday night, 24th, and who since has had signs of pneumonia at the right base, with high fever, reaching at times to  $106^{\circ}$ . There has been no albumin in the urine, the respirations have not been above 48, she has had very little cough, and her general symptoms have not been alarming; but on three occasions she has had serious collapse-symptoms, the first on Sunday night, which lasted for only a short time, the second early this morning, at about 3.30, and the other about an hour ago. I found her in the following condition :

She lay on her back with the eyes open and fixed; the pupils small, and did not react well to light. The color of the face was fairly good; the lips red, not cyanotic. She did not reply to questions and seemed completely oblivious to her surroundings. The respirations were hurried, 40 to the minute. The appearance was rather that of a nervous or hysterical attack than of severe collapse. At first she did not look very ill, except that the sockets of the eyes were rather dark and a little sunken. The face, however, was not at all pinched. The pulse was 132, small, and easily compressible; when first felt it was quite regular. She had just been given a hypodermic injection of a drachm of brandy, and she was ordered hypodermics at once of ether and strychnine. I remained about half an hour, during which time she changed remarkably. The unconsciousness persisted; she moved the mouth somewhat, and it twitched a little. The limbs were motionless. The heart-sounds at first were perfectly clear and distinct, without murmur. Gradually they became feeble; the pulse rose to 140, was small, and beats were occasionally dropped. The color of the hands was at first good, the nails alone perhaps a little cyanosed. Gradually there was a suffusion of the fingers and then of the hands, and within less than half an hour after I saw her the pulse could not be felt at the wrist, and the heart-sounds were extremely feeble—only just audible. The respirations did not materially increase, but they became a little noisy, and her face changed somewhat in expression. It really looked as if the end was imminent.

P. S.—It was; she died at 2.30 P.M.

Mechanical interference with respiration or circulation is a very much less frequent cause of death. The interference may be the gradual exclusion of the air, by the filling up of the follicles, or the capillaries in extensive territories may be compressed. These factors occur together, and the depressing element of great loss of blood-serum, upon which Bollinger lays stress, must also be taken into account.

Very large areas of the breathing-surface may be cut off without seriously disturbing the cardio-respiratory mechanism. In no way is this more strikingly shown than by the condition of the patient after

the crisis. On one day with a lung consolidated from apex to base, the respirations at 60 to 65, the pulse 120, and the temperature between  $104^{\circ}$  and  $105^{\circ}$ , the patient may seem in a truly desperate condition, and it would appear rational to attribute the urgent dyspnœa and the slight cyanosis to the mechanical interference with the interchange of gases in the lungs. But on the following day the dyspnœa and the cyanosis may have disappeared, the temperature is normal, and the pulse-rate greatly lessened, and yet the physical condition of the lungs remains unchanged. We witness no more striking phenomenon than this in the whole range of clinical work, and its lesson is of prime importance in this very question, showing that the fever and the toxins rather than the solid exudate are the essential agents in causing the cardio-respiratory symptoms.

Of course, there are cases in which the exit of air is gradually and effectually shut off by progressive consolidation until ultimately a point is reached in which the patient is simply smothered, and literally dies from want of breath. It is difficult to say how much breathing-area is needed to maintain life. That a man can get along with very little, if the removal takes place gradually, is shown by cases of progressive tuberculosis of the lungs. In pneumonia recovery is not infrequently seen after consolidation of one lung; rarely after consolidation of one lung with one lobe of the other. One occasionally meets with cases in which both lungs are almost completely solidified. In Case 49 of my series of autopsies the left lung, with the exception of the anterior border, was in a state of uniform red hepatization; while the right was in a state of gray hepatization, with the exception of a still smaller portion of the anterior margin. In these cases the dyspnœa is usually urgent and distressing, and the cyanosis early and pronounced; while the cerebral features of the disease may be completely absent. But even here we must be on our guard against a too mechanical conception of the process. While theoretically we may suppose great obstruction to the pulmonary circulation to exist in consequence of the compression of the alveolar capillaries by the exudate, it has been shown by the well-known experiments of Welch that it is exceedingly difficult to raise the blood-pressure in the pulmonary artery by cutting off territories of the circulation in reality much more extensive than are ever involved in pneumonia.

As I have already mentioned, in speaking of the remarkable phenomena associated with the crisis, additional factors must be considered, namely, the weakening influence of the fever on the heart-muscle and the depressing effect of the toxins on the cardio-respiratory centres. This explains in part, too, why we do not get such satisfactory results from venesection in pneumonia as in similar conditions of dilatation of the heart with cyanosis, in emphysema, arteriosclerosis, and valvular

disease. While it is rare in the one to see even copious venesection followed by relief, in the others the good effects are often most striking.

The toxæmia outweighs all other elements in the prognosis of pneumonia; to it (in a gradual failure of strength or more rarely in a sudden death, as in the cases here given) is due in great part the terrible mortality from this common disease, and unhappily against it we have as yet no reliable measures at our disposal.

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## A CLINICAL, PATHOLOGICAL, AND EXPERIMENTAL STUDY OF FRACTURE OF THE LOWER END OF THE RADIUS WITH DISPLACEMENT OF THE CARPAL FRAGMENT TOWARD THE FLEXOR OR ANTERIOR SURFACE OF THE WRIST.<sup>1</sup>

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COLLEGE OF PENNSYLVANIA.

It is believed by many that forward displacement of the lower fragment in fractures of the base of the radius is of rarest occurrence, and that the backward or dorsal displacement is almost universal. While it is true that the latter is the common deformity, the forward displacement happens in a considerable number of instances.

The usual, or so-called classical, fracture of the radial base, to which the name of Colles has been attached by English writers, generally, if not always, occurs because the patient receives the force of a fall upon the palmar surface of the hand. The displacement is the result not of muscular action, but of the vulnerating-force, and the relative position of the fragments will be practically always the same if the force has been sufficient to cause separation of the fracture-surfaces. The exact line of break will make little difference, because the muscular surroundings have so little to do with the causation or continuance of the distortion. In this injury the lower fragment is driven backward toward the dorsal surface of the forearm.

Displacement of the lower fragment in the opposite direction—that is, toward the flexor aspect of the wrist—would probably be equally common if the force in falls was received so frequently on the back of the hand.

I have seen no fracture immediately after its receipt in which forward displacement has taken place; but on three occasions I have seen old

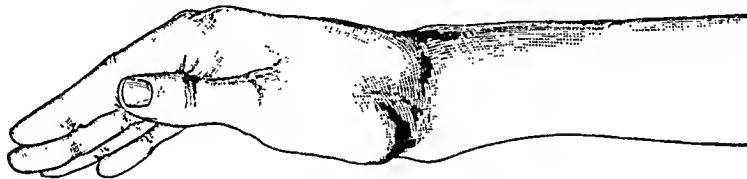
<sup>1</sup> Abstract of a paper read by title at the meeting of the American Surgical Association, May, 1896.

fractures which seemed to have been injuries of this kind. The literature of the subject is scanty, but I have collected a number of recorded cases, and have obtained accounts of others by personal correspondence. A limited search in museums has been rewarded by the discovery of a fairly large number of specimens, most of which, however, have come from dissecting-rooms, and have, therefore, no clinical history.

The scarcity of reported cases is, without doubt, due to the fact that the younger members of the medical profession have, as a rule, charge of the hospital-dispensaries, where the great proportion of forearm fractures are treated; while the older surgeons, who would be more likely to recognize the interest of an unusual deformity, have comparatively little opportunity to study such injuries critically.

*Old injury to the wrist, believed to be fracture of the lower end of the radius, with anterior displacement of the carpal fragment.* (Author's first case) A man, J. Mc.D., aged about thirty years, received an injury to the right wrist in the early part of 1891, which was about eighteen months before I made the cast of his forearm and hand. He was unloading lumber from a car, and by some of the lumber falling was thrown around in such a manner that he struck his right hand against the corner of the car, and, to use his own expression, "put it out." Immediately after the injury his associates "pulled it into place."

FIG. 1.



Radial side of wrist. Case I.

I was unable to get an accurate account of the exact position of the hand at the time of the injury, but the patient seemed to think that it was bent backward and not forward. He seemed quite certain that the force was not applied to the hand in such a way as to flex it.

FIG. 2.



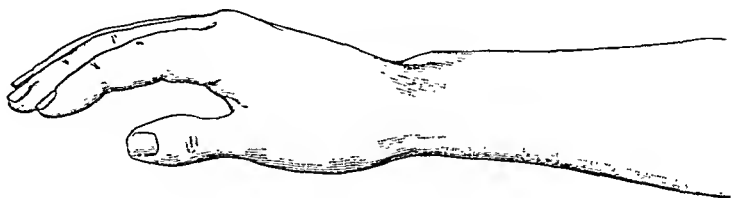
Ulnar side of wrist. Case I.

Some time after the injury, when the swelling had largely disappeared, he was sent to me by Dr. J. P. McClercy, of Milton, Pa. I concluded that the injury had been a fracture of the lower end of the radius, with the lower fragment displaced forward, and that union had taken place with the fragments in malposition because reduction had

not been accomplished. I determined to attempt refracture of the deformed union with the object of obtaining a better apposition of the fragments.

The head of the ulna seemed prominent on the dorsal surface of the wrist, very much as in the ordinary fracture of the lower end of the radius with backward displacement. There was marked prominence on the palmar aspect of the wrist, which did not involve the lower end of the ulna. Above this prominence—that is, toward the elbow—I could push my fingers deeply inward toward the shaft of the radius,

FIG. 3.



Radial side of wrist. Case II.

and it seemed as if there was quite a steep ledge of bone a short distance above the line of the wrist-joint, such as would be caused by the lower fragment lying in front of the shaft of the bone. The prominence was very hard and was covered by the flexor tendons, which could be felt coming over the edge of the supposed displaced fragment and to a certain extent concealing its outlines. The back of the wrist at the radial side presented no special change. While the patient was in the city awaiting treatment he became intoxicated, and suddenly went home.

*Old injury of the right wrist shown by skiagraphy to have been fracture of the lower end of the radius with forward displacement of the carpal fragment. (Author's second case.)* In April, 1894, I had under my

FIG. 4.



Ulnar side of wrist. Case II.

care at the Woman's Hospital a woman, aged thirty-nine years, who, about twenty months previously, had fallen down a stairway into a cellar. Voluntary extension and flexion at the wrist were impaired, and pronation and supination almost, if not entirely, absent. Passive pronation and supination could be made to a slight extent, but caused pain. There was abnormal deflection of the hand to the radial side, due to shortening of the bone, such as is seen after the ordinary fracture of the base of the radius. The ulna was abnormally prominent on the back of the wrist and the carpus on the ulnar side seemed to be displaced forward. The outside of the head of the ulna seemed to be a little irregular, as if there might have been some slight fracture there.

The tendons of the radial flexor of the wrist and of the long palmar muscle were exceedingly prominent on the palmar aspect of the forearm

FIG. 5.



Skiagraph.

FIG. 6.



Skiagraph.



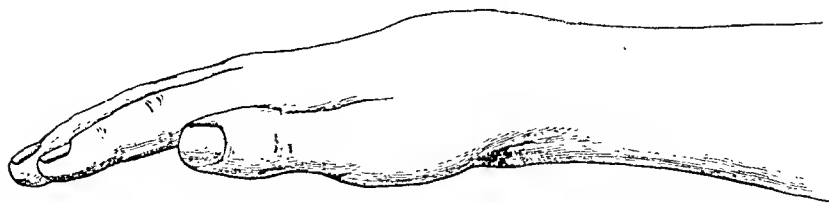
near the wrist-joint. At the ulnar side of these tendons was felt upon firm pressure a hard mass, apparently of bone. On the back of the wrist below the head of the ulna, and crossing over to the radial side, a distinct transverse groove was felt by deep pressure. It was either in the carpal region or at the lower end of the radius. This gave the impression that for some reason the carpal bones, with perhaps a detached piece of the radius, occupied a more anterior position than normal.

The discovery of the permeability of the soft parts of the human body to the Röntgen ray has recently given me opportunity to prove the correctness of my diagnosis. The skiagraphs taken for me by Prof. Goodspeed show that the injury was a fracture with anterior displacement similar to the specimen in the cabinet of the New York Hospital, described in a later part of this essay.

*Probable fracture of the lower end of the radius with forward displacement due to extreme flexion of the wrist.* (Author's third case.) I recently met, socially, a young physician who had injured his left wrist a year and a half previously while playing foot-ball. He said that while passing the ball from his left hand to his right side he was tackled and grasped by the left thigh. His left wrist was flexed at the time. He fell with his left arm and hand under him, and felt something snap at his wrist as the joint was forcibly flexed between his body and the ground. The deformity consisted, he says, in the hand being displaced forward. His companions pulled on the hand to overcome the deformity, believing that he had sustained a dislocation of the wrist. He says that there was no "snap," such as is heard when a dislocation is reduced. A physician who examined the limb afterward obtained no crepitus, and thought no fracture had occurred; though the patient himself was convinced by the sound at the time of injury and his sensations that fracture had taken place. He thought it involved the carpal bones.

When I met this gentleman there was a marked thickening of the lower end of the radius in the antero-posterior diameter; and a hard projection could be felt under the flexor tendons. I have little doubt that he sustained a fracture of the radial base, with forward displacement of the carpal fragment. The displacement was either not great, or was partially, but not completely, reduced immediately after its occurrence, by efforts to reduce a supposed luxation.

FIG. 7.



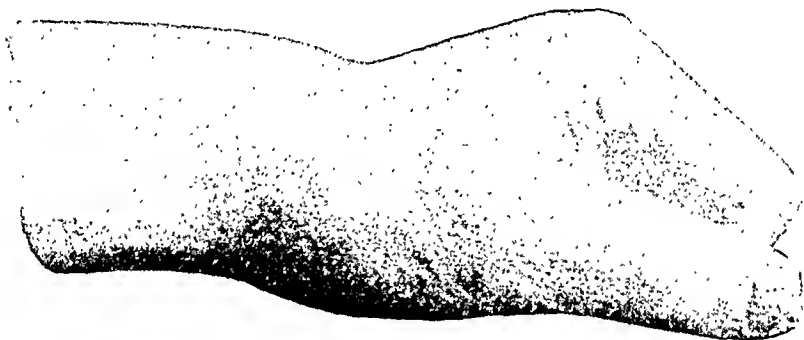
Radial side of wrist. From cast of case of Prof. E. H. Bennett, Dublin.

I have collected by correspondence histories of twelve other cases occurring under the observation of Dr. F. N. Drake, of San Francisco; Dr. T. E. Nott, Jr., of South Carolina; Dr. J. Clark Stewart, of Minneapolis; Dr. W. G. Johnston, of Pennsylvania; Dr. E. K. Sprague, of U. S. Marine-Hospital Service; Dr. J. R. Lehman, of

Pennsylvania; Dr. W. M. Mastin, of Mobile; Dr. C. H. Mastin, of Mobile; Dr. J. McF. Gaston, of Atlanta; Dr. John H. Packard, of Philadelphia; Dr. J. S. Wight, of Brooklyn. These cases, I believe, have never been published.

After a very thorough search in surgical literature I have discovered nine other cases reported. This makes with my own three cases a series of twenty four clinical histories. In addition to these clinical reports of special cases I have letters from a number of surgeons stating that they recollect seeing such fractures, but have no detailed notes of the patients at hand. They are Dr. John Ashhurst, Jr., Philadelphia; Dr. A. C. Cabot, Boston; Dr. R. F. Weir, New York; Dr. J. William White, Philadelphia; Dr. J. M. Barton, Philadelphia; Dr. Roswell Park, Buffalo; Dr. John M. Parmenter, Buffalo; Dr. Carl Gussenbauer, Vienna; Dr. W. S. Halsted, Baltimore; and Mr. Thomas Bryant, London.

FIG. 8.



Photograph of cast of the case described by R. W. Smith in his *Treatise on Fractures in the Vicinity of Joints*. Cast obtained from Prof. E. H. Bennett, of Dublin.

On the other hand, the injury has not been seen, or at least the fact of seeing it is not recollected, by Sir James Paget, London; Max Schede, Bonn; Sir William MacCormac, London; Sir Joseph Lister, London; F. C. Abbott, London; Mr Clutton, Mr. Pitts, Mr. Battle, and Mr. Stabb, London; Prof. John Chiene, Edinburgh; Dr. Fordea, Hamburg; and Prof. V. Czerny, Heidelberg.

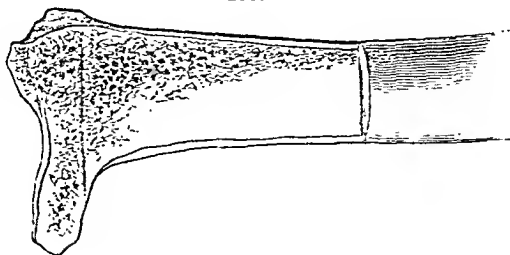
When I began this study I believed that the injury under consideration was rare, and it was my intention to make a rather extensive search in the various medical museums for specimens. I have been deterred from this step, however, to a considerable extent, because I soon found that museum-specimens illustrating the lesion were not so exceedingly uncommon as I had supposed.

I give a note of the specimens with which I am acquainted.

**SPECIMEN 1.** *Probable epiphyseal fracture with moderate displacement.* (Mütter Museum, Philadelphia. No. 1277<sup>55</sup>.) Lower end of right radius and ulna, showing the lower portion of the radius displaced forward after fracture.

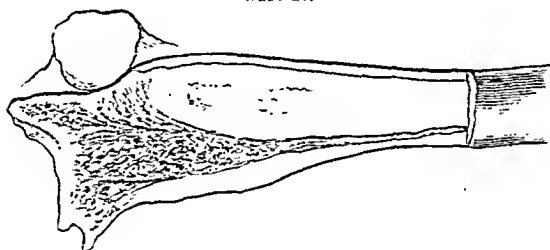
SPECIMEN 2. *Fracture with probable stripping up of the periosteum.* (Mütter Museum, Philadelphia. No. 1277<sup>60</sup>.) Lower end of right radius and ulna, showing anterior displacement of the lower end of the radius and dislocation backward of the head of the ulna.

FIG. 9.



Specimen 1. Mütter Museum.

FIG. 10.



Specimen 2. Mütter Museum.

SPECIMEN 3. *Oblique fracture with displacement.* (Mütter Museum, Philadelphia. No. 1277<sup>65</sup>.) Bones of right forearm and hand. Oblique fracture of the lower end of the radius, involving the joint. The lower fragment embraces the styloid process, the outer portion of the articular surface, and 1.5 cm. of the external border. Absorption and upward displacement of the lower fragment allowed the hand to be

FIG. 11.

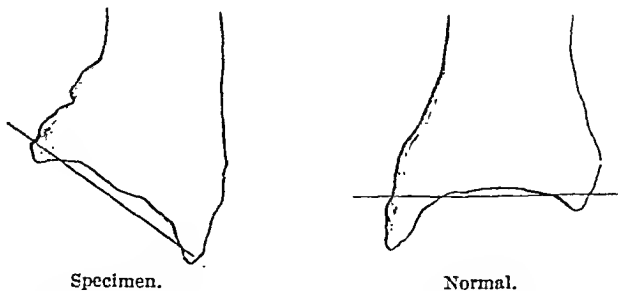


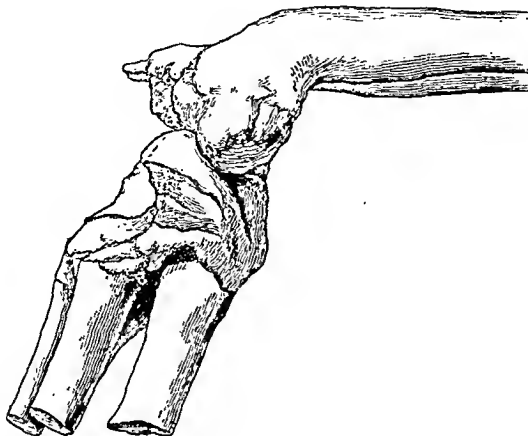
Diagram showing change in direction of articular surface in Specimen 3. Mütter Museum.

carried away from the ulna. Union has occurred with a slight amount of callus; the bone is smooth anteriorly, but is marked by an oblique groove posteriorly. The displacement here is forward. The lower end

of the radius is much altered by the great amount of absorption at the line of fracture. The articular surface presents obliquely toward the radial side of the forearm, so that its plane marks an angle of perhaps  $40^{\circ}$  with the normal plane.

SPECIMEN 4. *Fracture with very marked deformity.* (Museum Royal College of Surgeons, Edinburgh.) This characteristic specimen was

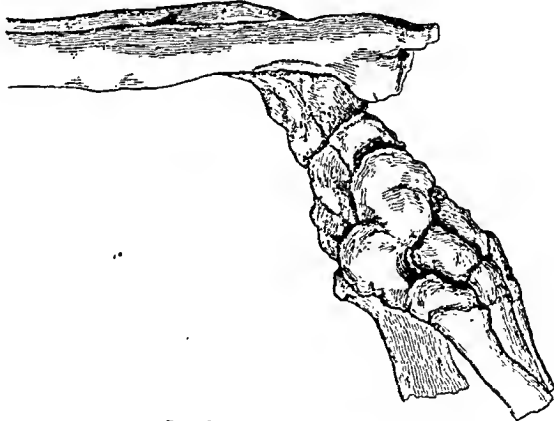
FIG. 12.



Specimen 4. Edinburgh.

obtained from a subject in the dissecting-room by Mr. Cathcart, to whose kindness I am indebted for the photographs from which the cuts have been made.

FIG. 13

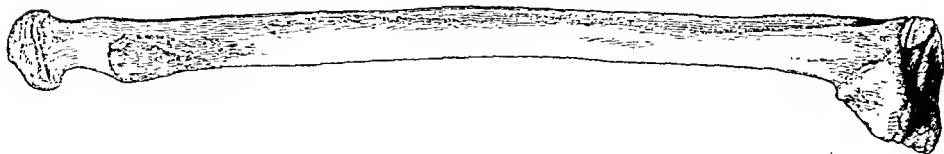


Specimen 4. Edinburgh.

SPECIMEN 5. *Fracture with angular displacement.* (Museum St. Thomas's Hospital, London.) Mr. F. C. Abbott has sent me two photographs of this specimen, which is the right radius. The catalogue of the museum states: "Union has occurred with a rare displacement of the lower fragment, which is tilted forward instead of backward. The articular surface presents no trace of having been involved in the fracture." The last statement evidently refers to the lower articular surface,

for Mr. Abbott writes that the articular facet for articulation with the ulna is distinctly involved in the line of fracture. Fig. 14, which represents the bone with the interosseous ridge toward the reader, shows the marked displacement forward—toward the right in the figure—the fracture-line involving the lateral articulating facet. The fracture

FIG. 14.



Specimen 5. St. Thomas's Hospital, London.

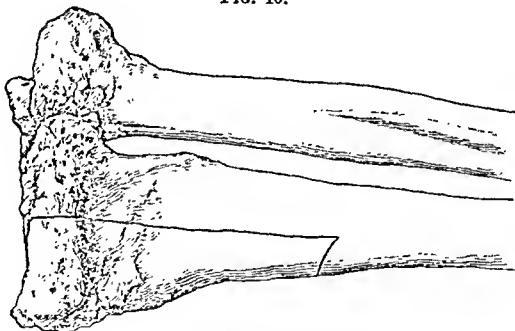
FIG. 15.



Specimen 5. St. Thomas's Hospital, London.

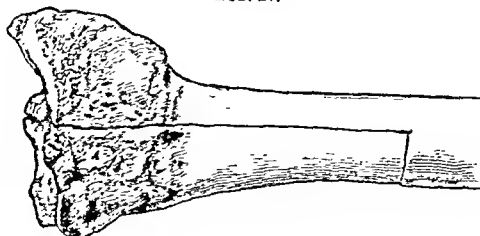
appears to have been a comminuted one. The second figure gives us another view of the bone. The specimen is doubtless the one shown at the London Pathological Society some years ago by Samuel G. Shattock.

FIG. 16.



Specimen 12.

FIG. 17.



Specimen 13.

SPECIMEN 6. *Fracture with impaction.* (Museum Westminster Hospital, London.)

SPECIMEN 7 is in St. Bartholomew's Hospital, London.

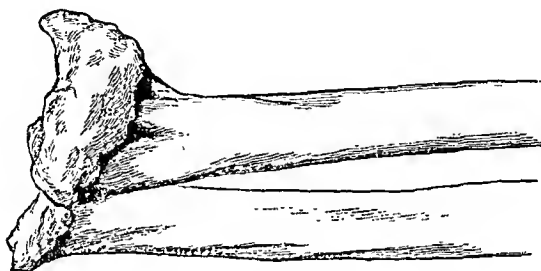
SPECIMENS 8 and 9 are in Queen's College Museum, Belfast.

SPECIMEN 10 is shown by a cut in Voillemier's *Clinique Chirurgicale*.

SPECIMEN 11 is an experimental fracture recorded by F. H. Hamilton.

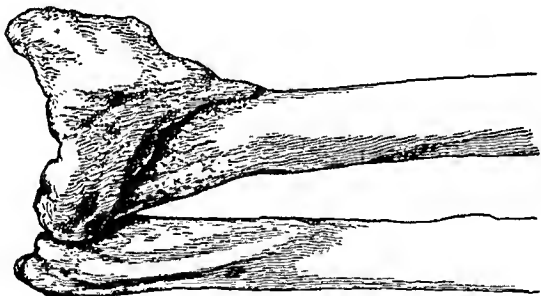
SPECIMENS 12, 13, 14, 15, 16, 17, and 18 are mentioned by E. H. Bennett, of Dublin, in *Transactions of the Royal Academy of Medicine in Ireland*, vol. x. 323, to whom I am indebted for photographs of the specimens.

FIG. 18.



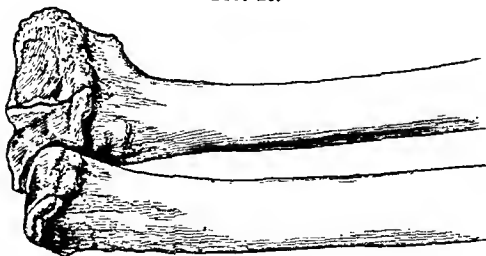
Specimen 14.

FIG. 19.



Specimen 15.

FIG. 20.

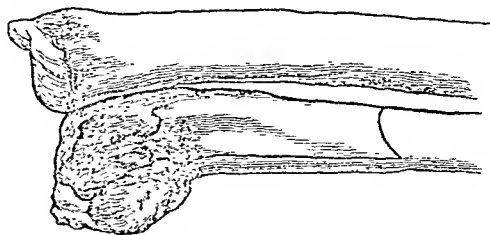


Specimen 16.

SPECIMEN 19 is preserved in Museum of Royal College of Surgeons in Ireland, and through the kindness of Mr. J. Alfred Scott I have obtained photographs and a cast.

SPECIMENS 20 and 21 are figured by Bardeleben.

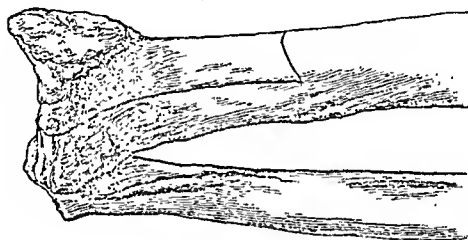
FIG. 21.



Specimen 17.

SPECIMEN 22 is preserved in the Pathological Cabinet of the New York Hospital. It is especially valuable, for the muscles have been preserved. I am indebted to Dr. Ferguson, the pathologist of the hospital, for the photograph of this beautiful and instructive specimen.

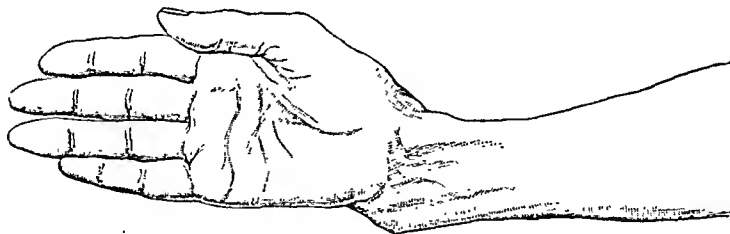
FIG. 22.



Specimen 18.

SPECIMEN 23 is a plaster-cast of the form of fracture contained in the cabinet of the New York Hospital.

FIG. 23.



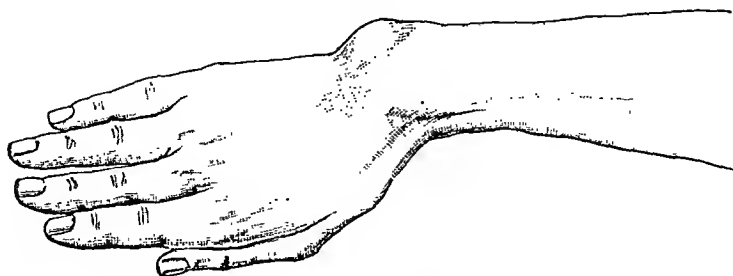
Specimen 19. Royal College of Surgeons in Ireland.

SPECIMENS 24, 25, 26, 27, 28, and 29 are in the Warren Anatomical Museum, Boston. Photographs in my possession were obtained from Dr. W. F. Whitney.

SPECIMENS 30 and 31 are in the Musée Dupuytren at Paris.

EXPERIMENTAL OBSERVATIONS. Ten experimental fractures were made on the cadaver to aid me to reach a conclusion as to the causation of this radial fracture with forward displacement. The details need not be here enumerated. In some of the experiments the carpal bones were fractured and the radius remained uninjured.

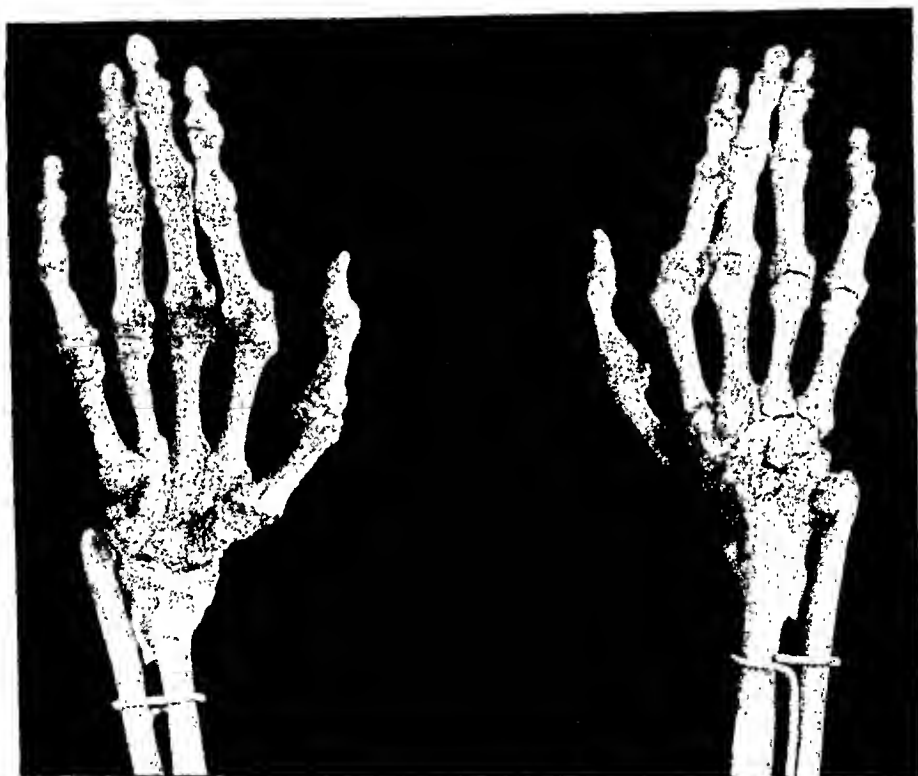
FIG. 24.



Specimen 19. Royal College of Surgeons in Ireland.

FIG. 25.

FIG. 26.



Palm. Specimen 19.

Dorsum. Specimen 19.

Specimen in Royal College of Surgeons in Ireland. In this specimen the lateral displacement is very great.

**CAUSES AND MECHANISM OF THE INJURY.** A study of the twenty-four clinical histories shows that in eleven cases the reporters attributed the injury to violence applied to the back of the hand and wrist. In four of these the opinion of the reporter was founded upon, or confirmed by, the occurrence of abrasions or bruises on the dorsal surface of the limb.



In ten cases no satisfactory account is given of the manner in which the force was applied.

In two instances it seems as if the violence may have been received on the palmar surface of the hand and wrist, though in neither of them is the evidence very convincing.

In one case it seems as if the injury was the result of extreme flexion.

I believe that a frequent cause of this fracture with forward displacement is extreme flexion of the radio-carpal joint, by which a portion of the base of the radius is torn off by a sort of cross-breaking-strain due to the fact that the dorsal ligaments retain their integrity. The continuation of the vulnerating-force after the fracture occurs gives rise to varying degrees of forward displacement of the carpal fragment. This was well shown in Experiment 1, in which I produced an epiphyseal fracture by forced flexion, but in which there was at first little forward displacement. By applying more power in a similar direction I was enabled to increase considerably the amount of displacement.

It is quite possible that fracture and anterior displacement may occur without flexion of the joint by direct violence applied to the posterior surface of the lower end of the radius.

Although my experiments numbered 2, 3, and 4 show that extreme flexion may cause fracture of the carpal bones, other experiments in the series show that, if the lower end of the radius is made relatively weak, the fracture occurs through the radius instead of in the carpus.

It is intelligible that the injury under discussion might be occasioned by the hand and wrist being held in machinery or caught in a hole while the arm of the patient was forcibly thrown in a dorsal direction. Such a mechanism is evidently not the usual one.

Lecomte's belief, that the radius is broken in this injury by falls upon the palm and that the anterior displacement is due to a secondary force applied on the posterior surface, will scarcely be accepted at the present day. It requires a more complicated mechanism than the opinion that the fracture and displacement are produced by one and the same force, applied upon the dorsum and causing overflexion. One of my experiments shows that forward deformity may be produced by extreme flexion after extreme extension has broken the radius.

My experiments on the cadaver just detailed, and analogy with the causation of fractures of the radial base with the usual backward displacement, seem to show that the fracture with anterior displacement is caused in three ways: 1. Tearing off of the lower end by a cross-breaking-strain exerted through the posterior ligaments during extreme flexion, when the force is applied to the back of the hand in front of the anterior surface of the radius. 2. Crushing of the anterior portion of the bone between the wrist-bones and the shaft, or mutual penetration of the diaphyseal and epiphyseal portions. 3. Rupture of the

bony tissue at the weakest point by decomposition of the force to which the limb is subjected.

It is probable that the fracture may be caused by any one of the three methods mentioned; but fracture at the weakest point of the radius and carpus by decomposition of forces seems to me to be probably the most common mechanism. The osseous injury is in some cases due perhaps to a combination of more than one method.

It is interesting to note that in one of Callender's cases fracture occurred from muscular contraction due to galvanic stimulation of the muscles. This was without doubt produced by the strong flexor muscles being too powerful to be successfully resisted by the relatively weak extensors, and the bone gave way at the epiphyseal line.

The muscles have indirectly some indefinite agency in the production of the lesion in the living subject, for by their normal tonic tension they keep the elbow-joint and wrist-joint fixed. They have also, I believe, some effect in limiting anterior displacement, for the extensor muscles are drawn tensely over the dorsal surface of the lower end of the radius as soon as the lower fragment attempts to move forward. This was shown well in my experiments on the cadaver. This restrictive influence would seem to be less operative in backward displacements, because the concavity of the anterior surface of the radial base does not afford the flexor muscles the same opportunity as that given the weaker extensors by the almost flat dorsal surface.

These various considerations have led me to the opinion that no one of the three methods of fracture detailed is exclusively responsible for all the cases.

Fracture with anterior displacement can occur from a splitting-force exerted on the articular surface of the radius by the first row of carpal bones being driven up against it. This is beautifully shown in my Experiment 10.

**SYMPTOMS AND DIAGNOSIS OF THE INJURY.** A study of the reported cases and specimens gives considerable light on the symptomatology of this fracture.

The injury appears to occur more frequently on the right side—a circumstance probably due to the fact that most persons, when falling, involuntarily use the right hand and arm for protection.

The line of fracture may be transverse or oblique. If oblique, it may run upward and inward or upward and outward. It may be so oblique upward and inward as to give to the upper fragment of the radius a sharp end, which will resemble the normal styloid process. This point, situated higher up the limb than the styloid process, may be driven into the lower layers of the skin, as in Poirier's case,<sup>1</sup> and cause a

<sup>1</sup> *Revue de Chirurgie*, 1894, xiv. p. 576.

dimpling of the integument. It is conceivable that a greater vulnerating-force would cause an open fracture by driving the sharp fragment through the skin.

It is quite probable that the plane of the fracture runs obliquely upward from the dorsal to the palmar surface of the bone, since this direction would be rather more apt to permit sliding of the carpal fragment forward. This argument is, however, not very strong, because the displacement is principally due to the vulnerating-force, and not to muscular traction causing overriding.

The break seems to occur generally at a distance from the articular surface of from one-half to one and one-half inches. In the specimen in the Museum of the Royal College of Surgeons in Ireland the line of fracture on the ulnar side of the radius is, however, one and three-quarters inches above the joint, and runs obliquely downward and outward until, at the radial side of the radius, it is apparently about one and one-quarter inches from the joint-surface. Specimen 1 seems to prove that the solution of continuity may be even nearer the joint than one-half inch, and there is no reason known to me why the line might not be very near. I have produced in the cadaver fracture with backward displacement and fracture with forward displacement, in which the line was only about one-quarter inch from the joint.

It is admitted, I think, that occasionally only the anterior edge of the lower end of the bone may be chipped off as was suggested by Barton, when he erroneously asserted that this chipping-off occurred at the posterior lip of the articular surface in the ordinary injury in this situation. Such injuries must, however, be excessively rare at the anterior margin of the radius, since they are almost unknown even in the fracture with posterior displacement. I have produced this injury in the cadaver.

Involvement of the articular surface with lines of comminution apparently occurs somewhat rarely. It is probable that it requires unusual force to cause such comminution of the lower fragment, and that the mechanism of its production is often an intrusion or impaction of the upper fragment into the lower.

The displacement of the lower fragment varies greatly. It is evident that there may be none. In some cases the displacement forward is comparatively slight, while the tilting or displacement laterally toward the radial or outer border of the arm is very marked.

The bending forward seen in the skiagraph of Case II. and in Specimen 22 would seem likely to occur in young bones only; but the age of the patient described as Case II. was between thirty-five and forty years at the time of the injury. It is possible that this condition occurs in adult bones by the anterior edge of one fragment being driven into the cancellated tissue of the other fragment, so that there

is little separation of the fragments on the dorsal surface. Union occurring without reduction might then give the appearance of the bone having been bent when soft.

It is possible for the carpal fragment to be thrust forward bodily, without crushing occurring or angular displacement taking place. In this instance the fractured surfaces would seldom entirely pass each other.

This form of displacement would be expected to give to the examiner's fingers the impression of a distinct mass of bone under the flexor tendons. Perhaps the upper edge or the obliquely placed palmar surface of the carpal fragment might be distinctly felt. In my first patient this was the impression conveyed to my fingers. The side of the lower fragment toward the ulna may sometimes remain in something like its normal relation to the shaft of the radius by reason of the radio-ulnar, the internal lateral, and the triangular ligaments being more or less uninjured.

Angular displacement may perhaps occur by the bone bending at the posterior surface as on a hinge, and the anterior portion being crushed or undergoing penetration or impaction. This would cause the articular surface to present abnormally downward and forward and give the appearance seen in several of the specimens.

It is also possible that the hinge-like motion between the fragments may occur at the anterior face of the radius, and the line of fracture be thereby opened on the dorsal aspect of the bone. It is possible that the open fissure would become filled and obliterated by callus if the fragments were left unreduced.

I have seen this opening of the fracture on the dorsum produced in my experimental fractures by rocking the fragments in endeavors to increase the deformity.

FIG. 27.



Fracture of lower end of radius with dorsal displacement of carpal fragment.  
Compare with Figs. 3, 4, and 8.

Whether the carpal fragment is displaced directly forward in a plane at right-angles to the horizontal plane of the radius, is tilted forward as upon a hinge at the flexor surface of the shaft, or is displaced laterally, with or without much forward distortion, seemingly depends upon the line in which the osseous fibres give way and the manner of application of the vulnerating-force.

The deformity of the forearm and wrist is characteristic in instances

where the carpal fragment is much displaced forward. An elevation is seen running across the back of the forearm obliquely upward from the ulnar to the radial side. The ulnar portion of this elevation is the more prominent, and is made by the head of the ulna, which was left behind when the carpal fragment of the radius with the attached hand was carried forward by the injury. On the radial side of the limb the elevation is further from the hand and is less prominent. It is due to the lower end of the upper fragment of the radius.

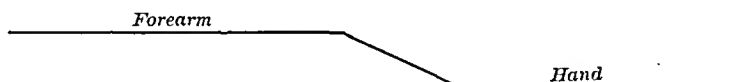
FIG. 28.



Experimental fracture with dorsal displacement in cadaver, showing elevation at back of wrist and projection of lower end of upper fragment on palmar surface.

This dorsal prominence is quite different in appearance from the hump on the radial side of the dorsum seen in fracture of the lower end of the radius with backward displacement of the carpal piece. In the latter case the elevation is great on the radial half of the limb, and the surgeon's finger carried along the back of the shaft of the radius can readily feel the ledge of bone corresponding to the upper portion of the lower fragment. The ulna makes little or no prominence on the back of the forearm in the classic fracture; though in both forms it is apt to be prominent on the ulnar edge of the limb, because the outward displacement common in both instances carries the hand away from the head of the ulna.

FIG. 29.



*Diagram of Deformity in Fracture with Forward Displacement*



*Diagram of Deformity in Fracture with Backward Displacement*

In the fracture under consideration the surface slants downward from the dorsal elevation toward the back of the hand, whose plane is at a lower level than that of the forearm, but more or less parallel to it.

The occurrence of these three planes in the fracture with forward displacement is due to the movement normally allowed between the dis-

placed articular surface of the radius and the first row of carpal bones and between the first and second rows of carpal bones. The articular surface of the radius is displaced so that it looks forward. Therefore the extensor muscles cause the first row of carpal bones to roll backward and give rise to a similar movement between the two carpal rows. This slant in the surface below the dorsal elevation causes somewhat the appearance of a furrow across the forearm, which is deeper just below the head of the ulna. Pressure with the fingers will make this hollow more evident and show that the lower end or base of the radius occupies a position more anterior than normal. This sulcus, like the elevation, is a little further from the hand on the radial side.

On the palmar surface there is some prominence, due chiefly to the lower fragment, but it is less marked than the elevation seen on the dorsum. This is probably due to the fact that when the hand is carried forward with the base of the radius the flexor tendons must span the arch made by the broken radius and the carpus. They thus obscure the deformity in the bony outlines, which would be made conspicuous if the palmar surface of the radius was normally flat like the dorsal surface. In the fracture with dorsal displacement the overlying tendons are pushed up and increase the elevation; in the fracture with palmar displacement the tendons are stretched across an abnormally great arch, and therefore conceal to a certain extent the change in the contour of the bone.

The pisiform bone makes, however, it is said, a more pronounced elevation than normal. This is intelligible when it is remembered that the ulna and the hand have parted company, as it were.

The lower fragment may perhaps be felt as a hard mass under the flexor tendons. It seemed as if this were pretty clearly established in my case marked I. The prominence and hard mass will be disconnected with the lower end of the ulna. This point aids in distinguishing the injury from fracture of the lower end of both radius and ulna. In my patient (II.) the normal hollow on the palmar surface just above the base of the thenar eminence is absent, and bone can be felt there. This obliteration of the hollow is probably due to the rotated scaphoid and trapezium.

The great deepening of the normal curve of the palmar surface of the lower end of the radius would seem to be a necessary feature of cases in which the lower fragment was simply tilted forward or the bone bent as in Specimens 22 and 28. It is conceivable that the base of the radius might be broken from the shaft and displaced forward, but so rotated on its transverse axis that its articular surface for the carpus would present somewhat dorsally, instead of being made to look more toward the flexor surface than normal. Such a displacement would probably obliterate instead of increase the normal arch of the palmar

surface of the radius. Comminuted fractures would be likely to cause irregular distortions and increased masses of callus.

The lateral deformity which is usual is deviation of the hand toward the outer or radial side of the forearm. This sometimes causes a concavity of the lower part of the radial border, and is due to the shortening of the radius from the crushing of the bony tissue or from the outward tilting of the lower fragment in oblique fractures. In Poirier's case the hand had a tendency to deviate to the ulnar or inner side of the arm because the line of fracture ran obliquely downward from the ulnar to the radial edge of the bone. This is apparently very rare. The specimen in the Museum of the Royal College of Surgeons in Ireland shows deviation to the radial side, which is the common form, in an excessive degree. In fact, there is very little forward displacement in this specimen.

The tendon of the ulnar flexor of the carpus which is inserted into the pisiform bone becomes prominent in the fracture under consideration, as would be supposed from the statement made previously that the pisiform bone becomes more projecting than in the normal hand. In one of my cases (II.) the tendons of the radial flexor of the carpus and the long palmar muscle stand out quite prominently at the wrist.

Careful observation of patients with this fracture will, I think, show that there is a tendency for the base or upper border of the thenar eminence to ascend toward the elbow, because of the relative shortening of the radius. The upper margin of the hypothecar eminence is usually, I think, in uninjured limbs nearer the elbow. Hence a line drawn across from the upper margins of these eminences, when the axis of the hand corresponds with the axis of the forearm, will generally be oblique, with the ulnar end nearer the elbow. In this fracture the line will be more or less transverse, or perhaps have its radial end nearer the elbow. This displacement, of course, depends on the change in length of the radius and the outward deviation of the lower fragment.

The deflection of the hand radially causes, necessarily, the head of the ulna to become very prominent on the inner or ulnar border of the lower part of the forearm. It is also prominent on the back of the arm. If the lower fragment is displaced very much, both inward and forward, the ulnar head becomes prominent both dorsally and at the ulnar border of the arm. If the forward displacement alone is great, the projection of the ulnar head is chiefly backward. If the displacement of the carpal fragment is mainly outward, the projection of the end of the ulna is noticeable chiefly on the ulnar side of the limb. Variations from these extremes occur with the varying directions of displacement of the carpal portion of the radius.

The transverse diameter of the forearm at the region of fracture is not likely to be much increased in this fracture. The antero-posterior

diameter, however, may be a good deal greater in the injured than in the normal arm. This would be expected particularly in patients in whom the lower fragment was displaced forward as a whole, and not simply tilted. In great comminution of the lower fragment the increased thickness of the forearm in the antero-posterior diameter would probably be quite marked, if the fracture were not properly reduced, and the small pieces of bone were welded together by a mass of callus.

A careful examination of the styloid process of the radius will show in all cases, except those in which there is no displacement of the lower fragment, that this process has been displaced forward. It very often will also be displaced outward. Its most readily observed change in position, however, is the elevation toward the elbow due to the bending, to the impaction, or to the crushing of bony tissue.

The styloid process of the ulna may be broken off at the time of injury. Specimen 2 is an illustration of this complication, for the styloid process of the ulna is seen to have been the seat of a fracture, though it is now united to the head of the bone.

The force which carries the hand at the time of fracture away from the ulna may cause the styloid process of that bone to tear through the skin.

FIG. 30.

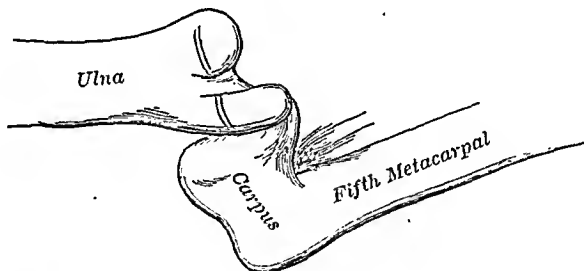


Diagram showing the relation of carpus and ulna in specimen in New York Hospital.

The articulating surface of the radius cannot be made out by palpation in fracture with forward displacement, as in dislocation forward of the carpal bones. Its plane is in fracture carried forward. This would cause the hand to assume the appearance of flexion of the wrist joint, if it were not that the extensor muscles have a tendency to cause extension between it and the first row of carpal bones, and between the two rows of carpal bones, and thus bring the hand into a plane corresponding approximately with that of the forearm. This condition is particularly noticeable in the specimen belonging to the New York Hospital (22). The way in which the articular surface looks obliquely forward is beautifully shown in the specimens from the Royal College of Surgeons of Edinburgh (4).

No lateral motion is to be expected between the carpal bones and the



lower end of the radius, since the lateral ligaments, which prevent lateral mobility in the normal joint, are not disturbed by the lesion.

The carpus in these fractures seems to be shortened. This is probably due to the fact that the head of the ulna overrides the carpus, and that the lower fragment of the radius is displaced somewhat upward as well as forward. The carpus, of course, follows the radial fragment, and is displaced forward and usually outward.

In recent fractures voluntary movement is more or less restricted because of pain or fear of pain. In old cases in which reduction has been neglected stiffness in flexion, extension, and rotation is to be expected.

Preternatural mobility would be obtainable in comminution of the lower fragment in fractures where the periosteum was greatly lacerated, and, indeed, in most fractures where there was no impaction. In incomplete, or green-stick, fractures it would, of course, be unobtainable until the fracture was made complete.

The point of mobility and the point of pain on pressure will be in the neighborhood of from a half to one inch and a half above the joint. Firm pressure at this point will aid in the diagnosis where there is no special deformity or great mobility. In sprains the point of intense pain on making pressure with the finger will be over the joint, which is lower down than the point at which pain is experienced when a fracture exists.

Crepitus will be obtained in fractures in which mobility is present, but will not be demonstrable, or demonstrable only with difficulty, in cases in which there is little periosteal laceration. In cases of impaction the force applied to reduce the deformity and readjust the fragments will give a coarse, grating crepitus when the lower fragment is pushed backward into place.

The fracture will be easily reduced if sufficient force be used, but it requires a good deal of pressure applied directly over the flexor surface of the lower fragment accompanied by extension and counter-extension, and sudden extreme extension in a dorsal direction. At least, this is my belief from my experience in reducing the fracture with backward displacement.

There would be, I should think, little tendency for the deformity to recur after proper readjustment of the fracture. It may be thought that in this respect the injury would resemble a dislocation of the carpus with displacement in the same direction, but the reduction of the fracture is not accompanied by the sudden snapping noise which is heard when a dislocated carpus is reduced.

The fracture may be accompanied by such laceration of soft parts as to convert the injury into an open or compound one.

Fracture of the radial base with forward displacement may be mis-

taken for sprain of the wrist or contusion. Inflammatory thickening of the soft parts after contusion may greatly resemble fracture.

Backward dislocation of the carpus resembles fracture with backward displacement of the inferior fragment, and is not likely to be mistaken for fracture with forward displacement.

Forward dislocation will produce a deformity resembling in some respects that resulting from fracture with displacement forward. In most cases, however, the surgeon will probably have little trouble in distinguishing between fracture with forward displacement and forward luxation of the carpus. In the former the lower border of the dorsal prominence runs obliquely upward across the back of the lower part of the forearm from the ulnar to the radial side, being constituted by the head of the ulna and the lower end of the upper radial fragment. In the dislocation the elevation is either transverse or runs obliquely downward from the ulnar to the radial side, and is constituted by the articular ends of the radius and ulna.

In dislocation forward of the carpus the hand, according to Stimson,<sup>1</sup> may occupy any position between moderate dorsal and palmar flexion, the latter being more common; and the fingers are slightly flexed. I have never seen the injury, but would have expected slight dorsal flexion to be more common, especially if the carpus was displaced upward to any great degree. The greater strength of the flexor muscles, as compared with the extensors is, I presume, the explanation of the tendency to flexion of the wrist.

In this dislocation there is a marked hollow at the back of the wrist below the lower ends of the radius and ulna, which form an abrupt ending of the plane of the back of the forearm, running nearly transversely across the limb. There is a prominence at the front of the wrist under the flexor tendons. Perhaps the upper border of this prominence may be felt as a convex mass extending entirely across the forearm. The hand has the appearance of being shortened, and the distance from the styloid process of either side to the corresponding metacarpal knuckle will be found to be less than normal. The wrist will be decidedly increased in its antero-posterior diameter. The injury is probably rarer than fracture with anterior displacement of the lower fragment, but must be remembered as a possibility. A still rarer injury is incomplete dislocation forward of the carpus, in which the scaphoid and semilunar bones leave the radius, but the cuneiform bone maintains its normal relation with the triangular cartilage and head of the ulna.

Attention to the variations in the deformity, and a careful examination of the bony landmarks and of the relations of the two styloid

<sup>1</sup> Fractures and Dislocations, vol. ii. p. 361.

processes to each other and to the bones of the hand, will probably enable the surgeon to determine whether the injury in a given case is a forward dislocation or a fracture with anterior displacement. The snap with which the dislocation is reduced and the rapid acquirement of normal voluntary movement will point to dislocation. The grating crepitus felt when the fracture is reduced, the subsequent thickening from callus, and the delay in regaining motion will point to fracture.

**TREATMENT OF THE INJURY.** The treatment consists in immediate and complete reduction of the fracture, followed by a retentive dressing which will not interfere with the free use of the fingers.

The deformity must be overcome even if great force is necessary to put the fragments in normal position. The impaction that is probably often present may prevent a timid surgeon from obtaining the object sought; but one who understands the injury and the impaired function liable to result if the displaced bone is allowed to remain displaced will not be deterred even if he has to give a general anæsthetic and bend the forearm at its lower end across his knee.

He should grasp the metacarpus of the patient with one hand, the lower part of the forearm with the other. This should be done with the patient's hand in the supine position. The thumb of the surgeon's hand which holds the metacarpus should be placed on the palmar surface of the carpal fragment of the radius as it lies just behind the thenar eminence. Extension and counter-extension are to be made for a moment; the hand should then be suddenly bent backward in strong dorsal flexion, and at the same instant the surgeon's thumb should push the lower fragment backward into place. This can be done in a moment, and will not require anæsthesia. The reduction will be painful, but is so quickly done that as a rule etherization is unnecessary. If sufficient force is applied, the fragments will be driven into place at once with a coarse grating sensation. Occasionally a repetition of the manipulation may be needed to obtain perfect restoration of the bony contour.

In fractures which have been left unreduced for several weeks more power will be required because the reduction then becomes a refracture. Here it may be necessary to bend the united bone across the surgeon's knee, which is applied to the front of the forearm at the level of the fracture. After the fragments have been broken apart by extension and counter-extension, and a cross-breaking-strain over the knee, applied to the palmar surface so as to tend to increase the displacement, coaptation is to be accomplished by the manipulation just given for the reduction of recent fractures.

As in the ordinary fracture of the base of the radius, immediate and complete reduction is the essential of treatment. If reduction is perfect, there will be little trouble in most cases, and restoration of func-

tion will be prompt and perfect. Stiffness, pain, and other discomforts are due to imperfect reduction, which interferes with the movement of the tendons and probably causes injurious nerve-pressure.

In cases with little or no comminution, and with a transverse line of fracture, a cuff or wristlet of superimposed layers of adhesive plaster three inches wide, extending an inch and a half below and an inch and a half above the wrist-joint, and made sufficiently thick to prevent motion of the wrist, will be all that is necessary in the way of splint.

If the lower fragment is comminuted or easily displaced, because of the obliquity of the fracture-line, or if the patient is a boy liable to engage in boisterous games, a more rigid and elaborate splint may be demanded. Then a circular gypsum-bandage applied from the metacarpo-phalangeal joints to the upper third of the forearm is a perfect splint that exactly fits the irregularities of the patient's limb.

If there is danger of swelling causing either of these two forms of dressing to become too tight, the gypsum-splint or the adhesive plaster one should be split up the middle of the dorsum and held in place by a roller-bandage.

Instead of these dressings, the surgeon can readily construct and apply a dorsal or a palmar splint made of strips of gauze dipped in wet gypsum and moulded to the surface of the hand and forearm. In some cases it may be wise to use both a dorsal and a palmar moulded splint of this kind ; but usually either one, if made very rigid, will be sufficient.

A strip of wood six inches long, one inch wide, and an eighth of an inch thick, applied to the dorsal surface of the forearm and metacarpus, makes a good splint for these fractures. The dorsum of this region is straight, and a flat splint can therefore be properly used on the back of the limb.

If the attendant decides to apply a splint to the front of the limb instead of to the back, he must use a moulded splint which will conform to the curve of the palmar surface of the radius. Hence, plastic splints made of gypsum and gauze, or a moulded metal or gutta-percha splint, should be adopted. In all cases the fingers should be unrestrained during the entire period of treatment.

The results in fractures of the lower end of the radius with forward displacement will nearly always be good if reduction is immediate and complete. If the fragment is permitted to remain unreduced, restricted movement, pain, and deformity will persist.

Old cases with unreduced fragments should be treated by refracture, if the deformity or disability is marked. My experience in treating old unreduced fractures with backward displacement leads me to believe that six or more weeks is not too late to attempt remedial refracture. Osteotomy can be adopted if refracture is believed to be difficult. I would probably adopt osteotomy in fractures two or more months old.

Massage, hot fomentations, and electricity will do much good in neglected or previously unrecognized cases in restoring motion and relieving pain. The benefit derived by these means in Case II. was very great, though not begun until nearly two years after the receipt of injury.

## DIAGNOSIS OF DILATATION OF THE STOMACH.

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*(From the Pepper Laboratory of Clinical Medicine, No. 4.)*

THE diagnosis of dilatation of the stomach meets with two difficulties at the very outset: first, the class of cases to which the term is applicable, and, secondly, the difficulty of determining the lesser grades on account of the variability in the size of the normal organ. It would seem simple enough to decide what class of cases belong properly to this group of diseases; but practical experience leads us to believe that, though the diagnosis is made with unwarrantable frequency by those who are guided by superficial examination and by clinical symptoms often not at all distinctive, those who have pursued their studies from the modern scientific standpoint, on the other hand, withhold the diagnosis in certain instances in which a careful consideration of the whole subject would warrant the application of the term under discussion. The group of cases to which the latter observation has special reference is that designated atony of the stomach or motor insufficiency.

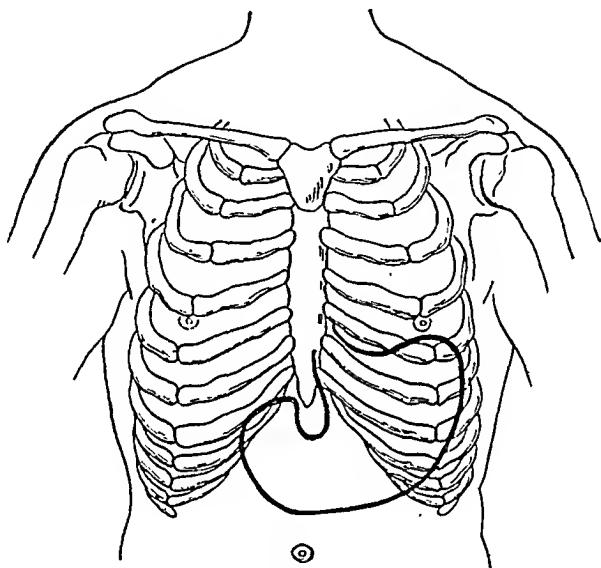
All writers, it is true, have recognized forms of dilatation dependent upon atony of the muscular walls of the stomach; but it has been customary to apply the term atonic dilatation to cases in which the process is well advanced, reserving the names motor insufficiency and simple atony to cases supposed to represent loss of motor function without change of size of the organ. This view, we believe, is incorrect and founded on too narrow a consideration of the conditions present in the stomach. There are doubtless cases of chronic interstitial inflammation of the stomach, or perhaps even of ordinary chronic gastritis, in which the organ is not enlarged and yet in which the motor function is diminished, just as there are cases of chronic interstitial myocarditis without cardiac dilatation and in which the heart-power fails; but the term atony of the stomach is here considered rather as applying to cases of neurotic

or degenerative weakness of the muscle itself, and in such cases we hold there is and must be from the first some, though possibly little, dilatation, just as in cardiac weakness due to obscure disturbances of innervation or to degeneration of the muscle-fibres a certain amount of dilatation must exist. Beginning with a primary disease or atony of the muscle of a hollow viscus there is, of course, a period when no enlargement has occurred; but this period is practically of no duration, for the very first evidence of the disease must, as a matter of course, be due to relaxation—that is, enlargement or dilatation. We hold, therefore, that what is termed atony of the stomach is merely a beginning-stage of actual dilatation, which may or may not progress, and that it should be so classified.

When, however, we approach the second difficulty alluded to, viz., the determination of the existence of dilatation in the anatomical sense by actual demonstrative methods, we at once realize the comparative inutility of all the plans proposed. The matter would be simple enough if it were possible to assign any definite limits to the normal organ or to determine a normal capacity; but both of these are impossible tasks. As far as the normal outline and position of the stomach are concerned, we are quite firm in the belief that Luschka's outlines will be sufficiently represented by the accompanying figure. It will be noted that the pylorus lies in the angle between the right border of the xiphoid cartilage and the right costal margin; that the lower border or greater curvature is well above the umbilicus; and that the fundus lies beneath the base of the left lung and almost completely covered by its projecting margins. There is doubtless considerable movability with the respirations and with increased or decreased amounts of food; but the general points agree very closely with our observations in post-mortem examinations; and the latter, we may assert from our own experience in cases studied during life and post mortem and from the recent investigations of Meinert, furnish reliable indications of the position of the organ during life. We cannot, therefore, agree with those (Martius, Meltzing, and others) who assert that the normal position of the inferior margin of the stomach is as low as the umbilicus or lower. Such views, we are convinced, are based upon either unreliable methods or upon the study of cases of downward dislocation of the pylorus or the abnormal vertical position of Kussmaul. In these latter cases the stomach is not of necessity enlarged, though this may frequently be the case; but in any event it is to be noted that when the lower margin of the organ lies near the umbilicus or below it, and is due, in the main, to dislocation, a corresponding dislocation of the pylorus and of the lesser curvature may be expected. When, on the other hand, there is actual dilatation of the stomach the lower margin is similarly placed, but the lesser curvature and pylorus are then much less displaced. Some dislocation does occur in nearly all cases of dilatation excepting such as are complicated with

adhesion to the liver and other structures; but the downward displacement of the lower curvature is far in excess of that of the lesser curvature and pylorus in cases in which the dilatation is the principal or primary condition and the dislocation merely subsidiary or secondary. To this extent the study of the normal position of the stomach is, in our estimation, of value, and the recognition of the vertical position as an abnormal one of importance.

FIG. 1.



Normal position of the stomach. (After LUSCHKA.)

The second point concerning the anatomy of the organ to which we have alluded as offering difficulties in the recognition of dilatation is the size of the organ. That this varies greatly in different individuals would seem to require no special demonstration, but studies have been recorded which indicate how great a variability exists within the limits of what may be termed normal structure. In the casts made under the direction of v. Ziemssen it was found that the difference in shape, as well as size, of the stomach was very considerable in persons of about the same size; and Pacanowski found great variations in the area of gastric tympany in eighty-one cases. In Ziemssen's series the capacity of the organ was determined by filling specimens with water, and was found to fluctuate markedly; the greatest capacity, however, being 1680 c.cm. We have ourselves made studies in the same direction, taking cases in which no suspicion existed of gastric disease. The stomach in each case was filled with water under a pressure of about 25 cm. (part of the œsophagus being left attached). The smallest organ was found in a boy

of nineteen years, 1.73 m. in height, who had died of pulmonary phthisis. The stomach in this case held but 500 c.cm. of water. The largest stomach was found in a woman of twenty-nine years, of rather delicate construction, and 1.55 m. in height. In this case the stomach held 2600 c.cm. In other cases the capacity varied greatly between these limits, that of a number being over 1680 c.cm.—Ziemssen's maximum. It may further be observed that Beneke's figures also indicate a far greater capacity than do those of Ziemssen; but, after all, it is evident that the variability in the size of the stomach is too great to permit of absolute limits even for the maximum size of what might be considered a healthy organ.

The mere question of size has, therefore, lost much of its old-time significance as an indication of dilatation, and Ewald, Riegel, and others very properly call attention to the fact that all of the physical signs of enlargement of the stomach may be present without any evidence that there is functional insufficiency. To this condition Ewald has given the name *megastria* or *megalogastria*. Enlargement of the organ of such degree that it may be clearly spoken of as in excess of the maximum size found in ordinary healthy individuals cannot at once be termed dilatation. There must always be evidences that the motor power is deficient and that stagnation of food is taking place. It is going a step too far, however, to dispose entirely, as Boas does, of the term dilatation, and to classify all cases under the heading: Gastric Insufficiency, of the first or the second degree. Dilatation is a pathological entity not to be set aside in this manner, and though we agree with Boas in the important part he assigns to the want of motor power, we cannot agree that the latter should be made the basis of classification. There are undoubtedly cases of actual and sometimes considerable dilatation of the stomach in which the motor power has been augmented almost or quite to the point of restoration of sufficiency at first impaired by pyloric obstruction. A classification based entirely upon the study of the motor function would fail to include such cases among the pathological conditions of the organ, though in but a short time rupture of the compensation might occur, and the cases might at once fall into the category of insufficiency of the second degree, or of great gastric dilatation. Boas's classification owes its origin, we believe, to a recognition of the difficulty of determining whether the size of the organ has become augmented or not; but this is a difficulty that must be overcome, and not evaded.

From these preliminary remarks we may conclude that the term dilatation of the stomach is to be applied to a greater number of cases than has usually been admitted, and that in particular the condition known as simple atony or motor insufficiency is really an early stage of dilatation; that the mere determination of the size of the organ is not to be



considered a reliable indication of dilatation, though, on the other hand, the importance of enlargement must not be overlooked.

We would classify all cases in two groups, designating these as *atonic dilatation* and *obstructive dilatation*, respectively. We would reject the term mechanical dilatation, since certain cases of dilatation are essentially mechanical, in that they result from traction upon the walls of the organ, and yet are not mechanical in the sense in which this term is ordinarily applied, viz., as indicating pyloric obstruction. It is not our purpose to speak exhaustively of the causes of dilatation of the stomach, but we wish rather to review briefly the principal conditions giving rise to this disease.

Atonic dilatation may occur in two ways; first, by primary or absolute atony of the walls; and, secondly, by secondary or relative weakness. Primary atony of the walls with atonic dilatation of slight degree is a much more frequent condition than has been generally believed. It may occur in persons of relaxed fibre, in nervous, anæmic, or debilitated conditions, resulting from a variety of causes; or, on the other hand, it may be a complication of chronic or even of acute gastritis. In rare cases, as in those of Fagge, Endmann, Oser, Kundrat, and Boas, atonic dilatation may be acute, and in such instances it is prone to be serious. Some of these cases, however, are doubtless obstructive, the pyloric stenosis being due to spasm, the result of acute indigestion or hyperacid secretion. Usually it is a slowly progressive or a stationary process, largely influenced by the general conditions of the patient's system.

In the group of atonic dilatation due to relative atony of the walls may be included the cases in which overeating and drinking are responsible for the disease. In such cases the constant strain of large amounts of food gradually induces relaxation and enlargement; and it is likely, also, that hypersecretion and hyperacidity are first set up, and that these are largely the cause of the subsequent dilatation, being active in the way of causing pyloric spasm, or even hypertrophic thickening of the pyloric ring. Another form of relative atony of the walls of the stomach is that produced by adhesions or by the dragging of the omentum in corpulent persons. In such cases the natural tone of the stomach-walls is overcome and more or less relaxation ensues. Somewhat similar conditions are present in cases in which cicatrices of gastric ulcers occupy parts of the stomach removed from the pylorus. There results a weakening of the walls of the organ which terminates in dilatation.

The group of obstructive dilatation of the stomach comprises the cases dependent upon pyloric stenosis, whether this be organic or functional, and due to disease of the pylorus itself or to outside causes. It is scarcely necessary to make more than passing mention of the causes of organic pyloric obstruction. Carcinoma and cicatrices of pyloric ulcers are the important forms of stenosis; but occasionally other neoplasms

or hypertrophy of the pyloric fibrous or muscular tissues may be active. Among the rarer neoplasms causing obstruction we have seen a myoma of the muscularis which projected into the stomach and acted like a ball-valve, very much as, in certain rare cases reported in the literature, peach-stones or other foreign bodies have acted. In another case under our observation the stenosis was caused by infiltrating sarcoma. A number of times we have seen the pylorus occupied by a ring of fibromuscular tissue somewhat resembling, in its microscopic appearances, a scirrhus cancer. In such cases there has generally been a history of painful disorder of digestion and of constant hyperacidity, and we have no doubt that frequently repeated spasms, probably combined with inflammatory attacks, account for the formation of such hypertrophic conditions. Among the cases of so-called annular myoma of the pylorus, many, no doubt, belong to the cases here referred to. Repeated spasm may, however, result in dilatation without notable organic change at the pylorus. The antecedent causes which occasion spasm may be various. Hyperacidity and hypersecretion, and these in turn often dependent upon overeating and alcoholic excess, have been referred to. Acute and painful ulcers near the pylorus may act in a similar manner, and possibly displacement of the kidney or other abdominal diseases may give rise to reflex pyloric contraction.

Dislocation of the stomach, and especially the extreme vertical position, may cause a mechanical obstacle to the discharge of the gastric contents from the position alone, and a more serious obstruction in the form of a sharp angulation of the horizontal portion of the duodenum, or of the junction between the stomach and duodenum.

The causes of pyloric obstruction outside the stomach itself are very numerous. Tumors may compress the pylorus, or, as in one of our cases, inflammatory adhesions may bind it firmly to the head of the pancreas and the posterior abdominal wall. Some attention has been called to displacement of the right kidney as a cause of dilatation by Bartels, Malbranc, Schütz, Litten, and others, and one of the cases here reported by us belongs in the same class. We do not feel warranted in asserting that the gastrectasis in such cases results entirely from pressure upon the duodenum; nor, on the other hand, does it seem likely that the conditions are wholly coincidental. A consideration of the anatomical relations permits the suspicion that injurious pressure upon the duodenum might result from moderate displacement of the right kidney, especially if such displacement were due to downward and inward pressure of the liver, resulting from tight lacing. Some authors have urged that the very movability argues the unlikelihood of serious pressure occurring in this way; but with a moderately movable kidney the conditions are just such, we would urge, that so long as the thoracic compression is continued the kidney is forced against the vertical portion of the duode-

num. It has further been claimed that the peristaltic movements of the intestines are so active that the pressure of the kidney could scarcely cause obstruction. To this we would reply that the portion of the duodenum pressed upon by a displaced kidney is one of the least movable parts of the entire tract, being quite firmly attached by the reflection of the peritoneum lying in front of it. While for these reasons we are still disposed to believe that displacement of the kidney may occasion gastrectasis by direct pressure upon the duodenum, we are also inclined to believe that other causes act at the same time. Thus simultaneous gastric and visceral descent may cause angulation and compression of the duodenum, while reflex nervous spasm of the pylorus or neurotic relaxation of the entire organ may be the principal or the contributing causes in some cases.

**DIAGNOSIS.** The ultimate diagnosis of dilatation of the stomach must rest upon the recognition of deficiency in the power of the stomach to propel its contents into the intestine and upon the discovery of enlargement of the organ; but there are numerous features presented in the disease of a more or less significant character, which are discovered in a systematic examination by the methods of physical investigation. In very many cases the existence of the disease may be suspected from some of these general manifestations without minute or special examination of the stomach, and it is important to recognize these general features, especially in cases in which the degree of enlargement is such that doubt may arise as to the real existence of dilatation, or in which the motor function cannot be properly estimated or is not greatly disturbed.

We take up the diagnostic features of the disease in the usual order of physical examinations.

*Inspection.* The patient usually presents more or less characteristic general appearances. He is emaciated, often cadaverous, in appearance; the skin is dry and harsh and may be unnaturally wrinkled; after a time the epidermis becomes thickened and may form hardened scales upon the surface. The cutaneous circulation, particularly in the extremities, is sluggish, and coldness and blueness of the hands and feet are commonly observed. The patient's expression is apathetic and the facies are characterized by a peculiar haggardness.

The abdominal examination frequently reveals abnormal distention. This may be seen in the left hypochondriac or the umbilical region; but more frequently the upper part of the abdomen is hollow and depressed in a transverse furrow, while the hypogastric region is greatly distended. In advanced cases the hollowness of the epigastric region in contrast with the lower portions of the belly is a striking and significant fact. Not rarely peristaltic waves may be seen passing from left to right over the distended stomach, and occasionally reversed peristalsis or antiperistalsis may traverse the swelling from right to left. The veins of the

lower portion of the abdomen, particularly those passing upward over the iliac fossæ, are habitually enlarged and prominent.

*Palpation.* In cases in which the abdominal walls are lax it may be possible to feel the lower margin of the greater curvature throughout a considerable portion of its extent through the abdominal walls; and when the organ contains a certain amount of water it may be possible to produce a succussion-splash palpable to the examining-hand. More commonly no definite outline is palpable, but the peristaltic waves before referred to may be felt passing to and fro. Palpation is frequently of service in differential diagnosis in determining the existence of pyloric thickening or new growths.

*Auscultation.* Auscultation over the stomach frequently demonstrates signs indicative of the passage of liquid from the œsophagus into the stomach. The significance of these sounds, however, remains more or less doubtful, and they are of no practical service in the diagnosis of dilatation. Of some importance are the succussion-sounds heard when the stomach contains a certain amount of liquid and air. In themselves these sounds are of no special significance, since they are discovered in stomachs presumably healthy. When, however, they occur at times at which the stomach should normally be entirely free from liquid contents, their significance at once becomes apparent in indicating loss of motor function and abnormal retention of the gastric contents. These succussion-sounds vary very greatly in intensity, and certainly in the normal stomach never become distinct enough to be plainly audible at a distance, while in gastric dilatation we have repeatedly found them so distinct that they could be demonstrated to students standing about. Besides the succussion-splash another auscultatory phenomenon deserves mention, namely, the loud gurgling or rumbling sounds occasionally heard. Patients are frequently able to develop these when standing upright, and their significance is open to considerable question. For ourselves we have always felt that the existence of these sounds was indicative of gastric or intestinal relaxation, though it must be confessed that they are heard in cases in which dilatation could scarcely be supposed to exist.

The splashing-sounds referred to before may easily be simulated by sounds originating in the transverse colon or in other parts of the intestine and resulting from the presence of gas and liquid within the viscera. In cases of doubt, therefore, the colon should be carefully freed from its contents before the test is applied.

Of late, the attempt has been made to determine the existence of atony or of dilatation of the stomach by the amount of liquid necessary to produce splashing-sounds. This test, however, in common with others which we shall have occasion to allude to, lacks precision and significance, principally because of the varying capacity of the stomach in

different individuals, and because of the danger of mistaking dislocation of the organ for dilatation.

We shall refer again to auscultation in connection with percussion in describing the method of auscultatory percussion.

*Percussion.* The determination of the outline of the stomach by percussion is open to a number of fallacies, and deductions cannot properly be drawn on account of the varying anatomical conditions. Neither the relations of the various borders of the stomach to the different bony points of the thorax nor the actual measure of gastric tympany obtained in transverse, vertical, or other directions are reliable on account of the differences in structure and contour of the thorax in different persons, on the one hand, and on account of the very wide variation in the size of the stomach in presumably healthy individuals, on the other hand. In so far as the value of percussion itself is concerned, it must be recognized that the amount of distention, the quantity of material contained within the stomach, and the condition and position of adjacent viscera must largely influence the results. In particular, the position of the lower border is difficult to determine from the fact that the tympany obtained over the transverse colon may so closely resemble that obtained over the stomach that an accurate separation of the two is impossible. In the second place, not rarely the colon overrides the stomach and thus makes the determination of the lower border of gastric tympany impracticable. When the left lobe of the liver is enlarged or unnaturally prominent in the epigastrium it is difficult or impossible to determine the exact outlines of the stomach even though it be quite well distended. To a certain extent percussion may be rendered more precise and valuable by cleansing the colon carefully, and by repeating the percussion in different positions; but despite these precautions no reliable deductions can be drawn.

*Other Methods of Determining the Size and Capacity of the Stomach.* Perhaps the oldest method devised for this purpose is that of Leube, of introducing a stiff sound and palpating the end through the abdominal walls. The dangers and unreliability of this method have, however, led its originator himself to abandon it, and the method is no longer practised anywhere.

A variety of methods have been introduced which, for the most part, depend upon the amount of liquid that may be introduced into the organ. These, however, are all subject to objections of a serious character. The tolerance of the patient varies so greatly that one will complain of pain when the stomach is scarcely at all distended, while another will bear the greatest possible amount to be introduced. This objection alone would suffice to make these methods unreliable were there not the greater difficulty—that stomachs vary widely in their capacity in different individuals of the same age, size, etc. We therefore place no reliance at all

on these methods excepting so far as it may be assumed with tolerable certainty that a stomach which will accommodate 2.5 or 3 litres is probably larger than normal. The usual standard that has been adopted is 1700 c.cm.; but this is certainly too small to warrant positive deductions. In another group of methods the attempt is made to localize the lower border of the organ, and of these that which has attracted most attention is the method of Dehio. This observer, it will be recalled, determines the lower border by introducing measured quantities of water into the stomach and determining the lower border by percussion, the patient standing erect. He has determined that the lower border will be found 11.5 cm. below the end of the sternum after the introduction of one-quarter litre of water, and that the border descends between 2 and 3 cm. with each additional quarter litre introduced; but that in the normal individual the lower border never descends below the umbilicus. With this last conclusion we are quite ready to agree, though we cannot regard the method free from objections or its results valuable in the diagnosis of dilatation. Our own studies with other methods lead us to entirely the same conclusions regarding the lower border, viz., that it always lies above the umbilicus. When, however, it is found below the umbilicus the conclusion is by no means warranted that the stomach is dilated. The same thing will be found in dislocated stomachs, and this condition, we are convinced, is one of great frequency. The method itself is open to some objections which impair its reliability; but, on the whole, it is useful for the determination of the lower border of the organ. The great weakness of Dehio's plan, or rather the great error of many of those who have used it, is the interpretation that has been placed upon the results. We still employ the method and find it satisfactory; but in all cases we seek to control the result by auscultatory percussion and by inflation, and in particular to determine the position of the lesser curvature and of the pylorus. If, then, by Dehio's method we find the lower border of the organ below the umbilicus and the pylorus and lesser curvature similarly depressed, we conclude that dislocation or vertical position is the cause of the depression of the lower border rather than dilatation.

Finally, we would add a few words regarding the method of illumination. This, we must confess, has not from the first appealed to us as a practical method, though in hospital practice it seemed to offer the hope of accurate and useful results. Our own experience is very limited and not very encouraging; and if the results of Martius and Meltzing indicate the conclusions as to the normal situation of the stomach, and are to be attributed to the method, and not to their having investigated cases of gastropnoia, we are disposed to believe that gastrophosphoroscopia will not prove a reliable guide. Certainly the method of inflation, which can scarcely give erroneous results when it is at all suc-

and have come to regard it as the only satisfactory means of determining the size and position of the stomach.

We proceed now to the second point of importance in the diagnosis of gastric dilatation: to the determination of the motor activity or sufficiency of the walls of the stomach. Here, too, we find a number of methods recommended. Among the older of these is the salol-test, to determine the duration necessary for propulsion of the contents into the duodenum, the assumption being made that the decomposition of the salol speedily follows its entrance into the alkaline intestinal secretions. According to Ewald, this takes place and the resulting salicylic acid appears in the urine within forty to sixty minutes, in health, and not until a much later period in gastrectasis. It is unnecessary to enter upon the discussion of the merits of this test. Numerous observers have found and our own experiences have taught us that Ewald's method possesses no practical usefulness.

Another plan proposed was that of introducing a measured quantity of oil into the stomach and removing the portion remaining after two hours with the stomach-tube. This method has the great disadvantage that complete removal of liquids from the stomach is often impossible, and that the limits of normal motor activity probably vary more widely than such a test would permit us to believe.

The most reliable method of direct determination of motor insufficiency is that of v. Leube. According to this observer, all traces of a meal of meat, soup, and bread disappear from the stomach in the course of seven hours when the motor activity is normal. When atony is present food-remnants may be found at much longer intervals after the meal; and even on the morning of the next day when the test-dinner was given in the evening. This method is easily practised, and, in view of the wide variations which doubtless exist in different individuals, is as accurate as we may expect.

The elaborate methods of measuring and recording motor activity with the aid of instruments, acted upon by columns of water or air compressed in bulbs or other contrivances introduced into the stomach, are cumbersome, impracticable, and therefore useless. It is, therefore, unnecessary to consider their sources of error.

Dehio has claimed that his method of determining the lower border of the stomach by introducing measured quantities of water is useful also for the estimation of motor activity. He has found that in cases of atony the lower border of the stomach descends to the umbilicus with the addition of only moderate quantities of liquid, while the border in dilatation is found below the umbilicus even after the introduction of the first quantity. From such differences in different cases he would determine the less or greater motor power. This assumption, however, seems to us an unwarranted one, and we agree with Riegel in his assertion that greater

elasticity does not of necessity imply less motor power ; but entirely aside from this point, the method of Dehio is fallacious, in that it does not take into consideration movability of the stomach apart from dilatability. In addition to these methods of determining the motor power directly, there are certain examinations, particularly the chemical investigation of the gastric contents, which furnish evidence of the decay of food in the stomach. The most striking and obvious feature is the decomposition which leads to sour and ill-smelling vomita. To a certain extent this is a measure of the motor insufficiency, as is also the presence or absence of *sarcinæ*, yeast-fungi, and other organisms of fermentation and putrefaction. In cases of extreme delay of the contents of the stomach decomposition of the starchy and saccharine foods may lead to the fermentation of lactic, acetic, butyric, or other fatty acids, while putrefactive changes of proteids lead to ill-smelling gases containing sulphuretted hydrogen in particular. The existence of these substances in vomited matters, or in the stomach-contents removed with the tube, is always indicative of undue retention of the food. The amount and kind of decomposition that prevails depend to a large extent upon the kind of food taken and the character of the gastric secretion, especially upon the presence or absence of free hydrochloric acid. Boas has recently maintained that the presence of lactic acid in the stomach-contents after a test-meal containing no lactic acid is specially significant of carcinoma. This point is in a measure established, though it has not the pathognomonic importance Boas sought to give it. Lactic acid is occasionally found in non-malignant cases, as in one of our present series. On the other hand, repeated examination may fail to show it in cases of carcinoma, as we have found. We need not enter more fully upon this controversy now. Suffice it to say that lactic acid when present is an indication of stagnation.

The amount of urine is another indirect evidence of motor insufficiency. Von Mering's investigations and the subsequent clinical observations of many others have shown that the mucous membrane of the stomach plays little part in absorption, either of liquid or of other matters. In consequence, obstruction of the pylorus and vomiting lead to rapid desiccation of the tissues and to decrease in the quantity of the urine. This decrease, however, is largely dependent upon associated conditions, and may fluctuate considerably, so that the exact quantity is of little value in diagnosis or in determining the degree or progress of the disease.

We have thus sketched the principal methods of investigation and points in the symptomatology which are of value in the determination of gastric dilatation. Of necessity allusion has been made to certain methods which we do not ourselves employ, and of whose value and reliability there may be much question. The methods upon which we rely are those of auscultatory perussion and inflation, and upon Dehio's



method for determining the lower border of the organ. The mere determination of one or another of the borders of the stomach is of little value; but taken in connection with the other portions as determined by the same or supplementary methods of investigation, and with the discovery of deficient motor activity, the diagnosis can generally be made with ease. Mistaken diagnoses are more often the result of insufficient examination than of unreliability of methods at hand.

**DIFFERENTIAL DIAGNOSIS.** The points upon which this will rest have been more or less thoroughly considered; but it seems advisable to point out certain contrasted conditions with the indications pointing to one or the other, and to consider somewhat the methods by which an opinion may be formed as to the original cause.

*Megalogastria and Gastrectasia.* Ewald, Riegel, and others have described cases of enlargement of the stomach without symptoms of functional disturbance. Such cases are doubtless instances of physiological or natural largeness of the stomach, and may properly be designated as megastria or megalogastria. What we have before said regarding the variation in the size of the stomach in different persons need not be repeated, but it is clear that no definite limits can be assigned to what may be considered a normal stomach. How large a stomach may be without danger of stagnation of food on account of the mere capaciousness is difficult to say, and cases of enlargement sufficient to be certainly recognized by clinical methods, and in which no symptoms of dilatation are found, are comparatively rare. The diagnosis is simple enough, and depends altogether upon the fact that no sign of stagnation of food or of serious disturbance of digestion can be discovered. The only difficulty offered is to distinguish cases of obstructive enlargement with compensatory hypertrophy of the walls of the stomach. In the latter, however, there is always a history of gastric disease running backward for varying periods; and usually, if not always, the compensation is only partial, some deficiency of motor activity being present. The general appearance of the patient also gives important indications, and in cases of non-malignant pyloric stenosis there is usually excessive acidity of the gastric secretion, and subjective symptoms more or less severe.

*Gastroptosis and Gastrectasia.* Displacement of the stomach—the vertical position of Kussmaul or gastroptosis of Glenard—has long been recognized; but its frequency has been underestimated, and without doubt it has often been mistaken for gastrectasia. A consideration of the anatomy and relations of the stomach is convincing of the fact that displacement must affect the pyloric end almost entirely, while the cardiac end and fundus are more or less normally situated. The result of displacement, therefore, is a vertical position such as occurs in the newborn. In normal individuals, after early infancy, the position of Luschka is assumed and retained; but very often, as a result of the pressure of

clothing about the waist or of other causes, displacement occurs and causes the pyloric end to fall to lower levels than normal. The frequency of such pathological position is probably greater than has been generally believed, and in our experience with inflation of the stomach we have found it surprisingly frequent.

In gastrectasia the pylorus usually also descends somewhat, though rarely so much as in gastropptosis. When studied in relation with the lower border the position of the pylorus is found relatively little displaced. Dilatation habitually affects the greater curvature near the pyloric end more than other parts,<sup>1</sup> and in consequence the distance between the pylorus and the lower border becomes excessive. This is well seen in some of our diagrams (Figs. 2, 3, and 4) as well as in illustrations given by various authors.

These considerations show the value and necessity of determining the position of the pylorus and lesser curvature as well as that of the lower border, and the unreliability of basing deductions upon Dehio's method alone. If the pylorus is not much displaced and the lower border is below the umbilicus, dilatation probably exists; but if the pylorus is near the umbilicus, the low position of the lower border loses its significance. In certain cases of gastropptosis a moderate amount of associated dilatation may exist. In such cases the diagnosis, as far as the mere estimation of size is concerned, depends upon our judgment as to whether the descent of the lower border is out of proportion to that of the pylorus and lesser curvature or not. The absolute diagnosis, however, in such cases depends upon the determination of the motor activity of the walls.

*Obstructive and Atonic Gastrectasia.* The differential diagnosis between these conditions may be extremely difficult in some cases, particularly when the early history is wanting. Where a distinct ucoplasm is discoverable the diagnosis becomes a simple one; but in the absence of this it must depend upon a consideration of the course of the disease, and to a certain extent upon the degree. Very rarely does atonic dilatation reach the enormous grades sometimes witnessed in obstructive gastrectasia. In addition, it will be found that the course of the case is less regular and progressive. Not rarely there will be a history of early remissions and accessions in the disturbances, and when the patient is continuously under observation marked variations may be noted from time to time. Physical examination is less apt to discover peristaltic waves, and the chemical examination shows no such marked excess of HCl as is seen in many cases of non-malignant stenosis. It must be admitted, however, that some cases of dilatation beginning with hyper-

<sup>1</sup> Certain investigators have found that the portions of the stomach near the pylorus are especially active in expelling the contents. It is clear, therefore, that those parts would suffer most distention in cases of obstructive dilatation. In any event, however, the most dependent part of the organ would be prone to dilate.

acidity and hypersecretion are atonic rather than obstructive. Obstructive dilatation differs in its course mainly in that it is progressive and persistent. The earlier stages, during which compensation is maintained, may be marked by few symptoms; but after compensation fails, and often this occurs quite as abruptly as failure of compensation in cardiac disease, the disease is lasting and quite regular in its downward course. The dilatation in this stage often reaches proportions never attained in atonic cases.

*Malignant and Non-malignant Obstructive Gastrectasia.* The general appearance of the patient gives us less information than we might expect. Not rarely, as has been noted, the patient assumes a cadaverous, cachectic appearance in entirely non-malignant dilatation; while, on the other hand, instances may be found of cancerous obstruction in which the general appearance of the patient is quite good. The investigation by physical examination, and particularly the chemical examination, may furnish important diagnostic factors. The most significant fact is the discovery of excess of HCl in certain non-malignant cases. The mere presence of hydrochloric acid, even in cases of excessive obstruction with dilatation, does not exclude carcinoma, as we have several times found; but excessive hydrochloric acid does not seem ever to occur in such cases.

The presence or absence of lactic acid has been urged by Boas as a fact of diagnostic value. This, however, requires further confirmation. Boas himself admits the occasional presence of small quantities in non-malignant dilatation, and one of our present series of cases showed the same. On the other hand, lactic acid may be absent in cases of cancer, as we have also found. On the whole, however, it seems fairly well established that the occurrence of lactic acid (when sought after according to Boas's method) is a point of considerable value as indicating carcinoma. Further, it has been held by Boas that albuminous decomposition with production of sulphuretted hydrogen occurs in benign rather than in malignant cases; but we have found it present in both forms.

The discovery of a palpable tumor in the pyloric region is the most suggestive fact of all, and usually serves to establish a positive diagnosis. At the same time it must be remembered that hypertrophic thickening of the pylorus may simulate carcinomatous tumors, and that enlarged lymphatic glands and even the head of the pancreas may be felt and mistaken for carcinoma. Recently examination of the blood has been suggested as a means of making a differential diagnosis, the studies of R. Müller and Schneyer showing that digestive leukocytosis is wanting in carcinomatous stenosis but normal in other cases. Finally, the rapid progress of the case, occurring in a person beyond the age of forty, and without a history of prolonged gastric troubles, adds to the probability of the cancerous nature of the obstruction.

CASE I. *Obstructive dilatation; non-malignant stenosis of the pylorus.*—C. M., aged thirty-five years, a laborer, was admitted to the hospital December 7, 1895. His father had died at the age of forty-five years, the cause not known. His mother and four sisters are living and in good health. One sister died of pneumonia. Nothing in his family history bears on his present case.

He himself was a healthy lad until about his twentieth year, when he had a vague attack of malarial fever and was confined to bed for three weeks. In 1883 he was injured in a coal-mine, and in 1884 was again injured. In 1890, while working in an iron-mill, he was overheated and afterward chilled. This led to an illness which was called hepatitis and which confined him to bed for fifteen weeks. There were chilliness, vomiting, and a great deal of pain, the latter referred to a point on the right side between the anterior superior spine of the ilium and the umbilicus. The patient has always been a temperate man with regard to the use of alcoholics and chewed tobacco only moderately. He was careful in his manner of eating, generally taking his food regularly and chewing it well.

The illness which brought him to the hospital was gradual in onset and had been increasing during the past two years. He first noticed eructations of gas and then began to suffer with a heavy feeling in the stomach, relieved by vomiting. The latter did not begin until some time after the first symptoms, but became constant after their onset.

*Physical examination.* When the patient presented himself he was considerably emaciated, the malar bones standing out prominently. His voice was rather hoarse, his skin dry and scaly, and in general there was a desiccated appearance. On examination, it was found that the upper part of the abdomen (epigastrium) was rather hollow, while the lower part (below the umbilicus) was greatly enlarged. The superficial veins, especially those on the lower and lateral portions of the abdomen, were much enlarged. The size of the stomach was determined by auscultatory percussion and found to be unusually large. Splashing-sounds were evident when the fingers were pressed against the abdominal wall as well as on shaking the patient. The contents were removed with the stomach-tube and were found to consist of 2500 c.cm. of horribly offensive decomposed material. Chemical analysis of this showed a total acidity of 67, with a considerable proportion of free HCl (40 by Braun's method for free and combined HCl), and lactic acid in considerable quantity (Uffelmann's test).

The patient's blood was examined, showing 3,863,000 red corpuscles and 9300 white corpuscles. The urine showed as follows: volume for twenty-four hours, 1718 c.cm.; turbid and yellowish; reaction slightly alkaline; specific gravity 1020; no albumin; no sugar;  $P_2O_5$ , 3.126 g. (0.182 per cent.).

The patient was ordered lavage and a graduated albuminous diet, with a restriction of liquids, electrical stimulation, and colonic douches. Under this treatment his general condition improved somewhat, though the condition of the stomach remained about the same.

It was constantly found that the food of the previous day could be removed from the stomach in the morning, and sometimes portions of food from several days previous were thus obtained. There was constantly excessive acidity, and free hydrochloric acid was invariably found present, the quantity ranging from 30 to 56. Lactic acid was occasionally present to Uffelmann's test, but was never detected by Boas's method, though repeatedly sought for.

The size of the organ was evidently greatly in excess of the normal, and in practising lavage it was found that from  $2\frac{1}{2}$  to 3 litres caused no particular discomfort. Auscultatory percussion found that the organ extended from its usual position beneath the left lung and heart downward as far as the umbilicus and even further, and that the pylorus, though somewhat depressed, was separated from the lower border by a considerable space. Inflation with air gave a similar result, and the organ was readily demonstrable to a class of students in an amphitheatre.

The patient's general condition improved somewhat, but he continued to have burning pain, heaviness, disturbances of sleep, and attacks of vomiting.

It was finally decided to operate. Dr. J. William White was called in and performed the operation of divulsion, finding the obstruction at the pylorus

FIG. 2.

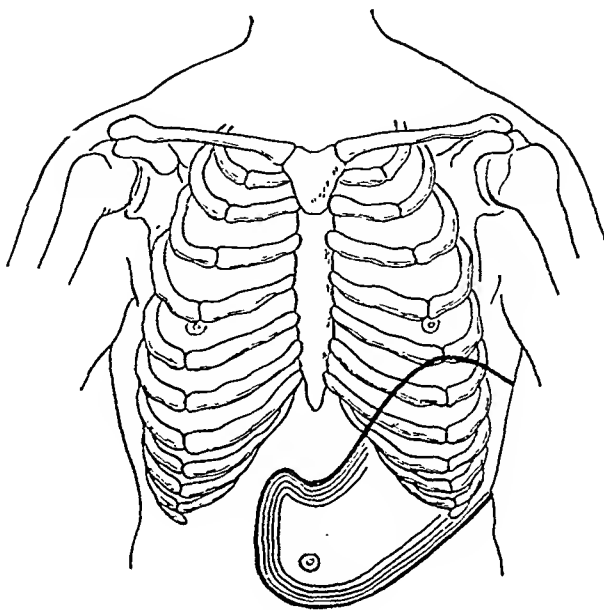
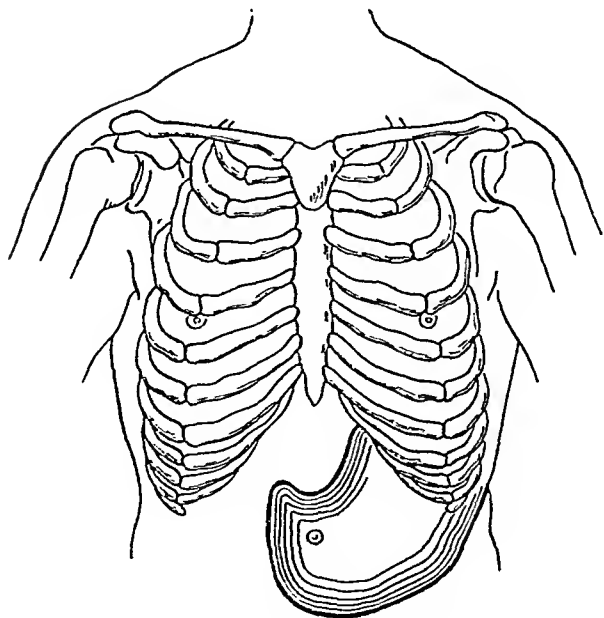


FIG. 3.



due to a circular ring of dense sclerotic tissue, which at first sight presented the appearances and feeling of a carcinoma.

The subsequent history of the case was eminently satisfactory, the recovery from the operation being prompt and the restoration of the stomach to its normal functions almost complete.

Lavage has been practised on two mornings and no food-remnants of the previous day obtained. A Boas's test-meal was found to have passed into the intestine after two hours.

CASE II. *Obstructive dilatation; carcinoma of the pylorus*.—C. L. P. was seen with Dr. Lee H. Smith, of Buffalo. The patient, a banker, aged fifty-four years, was treated twice in 1887, being operated upon for stricture of the urethra the latter time. A cure of this disease was effected, and there does not appear to have been any recurrence of the trouble. His general health since then continued to be very good until September, 1895, when he noted obstinate constipation—not relieved by usual exercise and diet. He never had any severe illness which confined him to his bed, but has always been bilious at times. Within two months of his death he began to lose weight very rapidly, and in five months the loss amounted to thirty pounds. Within the last three or four weeks of his life he vomited a few times. His digestion became very poor. Frequently his food gave distress, and sour, windy risings from the stomach were distressing. Bowels inclined to be constipated; no jaundice. He suffered with piles, especially when the bowels were constipated. The lungs and heart were examined with negative results, excepting slight cardiac debility. His general circulation was weak, due to anæmia. When the patient came under our notice the above symptoms and history were obtained from Dr. Smith, and in addition we made careful examination of his abdomen and stomach. There was extreme emaciation, and the skin presented an ashy hue. The abdomen was depressed above (hypochondriac and epigastric regions) and distended in its lower portions. A small tumor could be felt in the right side above the umbilicus, and on auscultatory percussion the size of the organ was found to be enormous. Splashing-sounds were very evident. Inflation was practised, and the stomach was found to occupy the position represented in the accompanying diagram.

Repeated examinations of the gastric contents had been made and the total acidity was habitually decreased; free hydrochloric acid was never discovered. Lactic and butyric acids were occasionally present, but it is not stated that special precautions were taken to exclude lactates from the test-meals. Pepton was often found. Sarcinae were seen microscopically; but no cancer-cells or acini.

The urine was high-colored and heavy (1028); contained excess of indoxyl, sulphuric acid, and a trace of albumin with fine granular casts.

The diagnosis of dilatation due to carcinoma of the pylorus was easily arrived at, and was subsequently confirmed by an operation performed by Drs. J. William White and W. W. Keen.

CASE III. *Obstructive (?) dilatation; movable kidney*.—Miss M. P., aged twenty-nine years, a typewriter by occupation, was admitted to the hospital December 10, 1893. Her father was killed in an accident; her mother was still living and had an aneurism of the aorta. She had had the usual infectious diseases of childhood, and especially diphtheria, which she had three times. In November of 1891 she had typhoid fever. The following notes were recorded:

Her present illness seemed to begin in June of 1892, when she first began to suffer with pain in the left hypochondriac region and with flatulence. The ingestion of food was followed by burning pain and by heaviness, but there was no vomiting. Previous to this time she had suffered with no disturbances of the appetite or digestion, and her bowels had been entirely regular. In July of 1892 she was thrown from a carriage and severely bruised. From this time the symptoms continued and gradually grew worse until March, 1893, when vomiting commenced. The matters vomited were dark in color and always extremely sour. At first this occurred at long intervals, but finally during the summer it was sometimes repeated several times a day. The patient became very much wasted and constipation grew progressively more intense. There were no menstrual periods after August,

tained food-remnants; and not rarely vomiting would bring up food taken on the previous day. The amount of liquid discharged by vomiting was often very great (2500 to 3500 c.cm.).

The urine was usually a little turbid, alkaline in reaction, and varying in its specific gravity from 1015 to 1020. No albumin or sugar, but excessive deposits of alkaline salts (phosphates and carbonates). Indican was found in excess.

The patient was placed upon a carefully regulated diet of albuminous character. Lavage of the stomach and cold douches of the colon were given at regular intervals, and at times nutritive enemata were ordered. No improvement occurred, and operation was decided upon. This was performed by Dr. J. William White. On incision, the stomach was found enormously enlarged, and a dense scar was found in the anterior wall, at the point where the feeling of induration had been detected. The serous surface adjacent to this was thickened. The pylorus itself was healthy, but was constricted by fibrous adhesion springing from the head of the pancreas, the posterior wall of the abdomen, and other adjacent parts.

CASE V. *Atonic dilatation; great improvement after six months' treatment.*—P. J. J., aged twenty-five years, was admitted to the hospital October 20, 1893. There was nothing significant in the family history.

The patient began to work in the coal-mines at an early age and continued to do so until two years before he came under observation. Since that time he had been following various pursuits, but for the year previous was almost incapacitated. He had used alcohol habitually and was always an excessive eater; and, as he himself confessed, he "eat enough for two men."

During the last six years he had had occasional attacks of pain in the stomach. They occurred especially at a considerable interval after eating, and were frequently relieved by vomiting of sour liquids. Eructations of gases were frequent. The attacks increased in severity and frequency until they occurred almost after each meal and quite disabled him from work. His appetite continued excessive, excepting at times when the attacks were not relieved by vomiting. At such times the fermentation seemed to continue and the eructations were always more severe and lasting. The bowels are obstinately constipated, and he had pain in the back. The tongue was generally clean.

*Physical examination.* The patient has a long, narrow chest, and the xiphoid cartilage and the lower part of the ribs are depressed, as is also the epigastric region. The abdomen below the umbilicus is much distended. The superficial veins over the latter part are greatly enlarged. Auscultatory percussion discovers a decided increase in the size of the stomach, the pylorus being somewhat depressed, but the lower border extending fully to the umbilicus, which is placed at an abnormal distance from the xiphoid on account of the unusual shape of the patient. Careful palpation of the abdomen reveals no induration or tumor and the intestines appear to be normal. The heart and lungs are healthy.

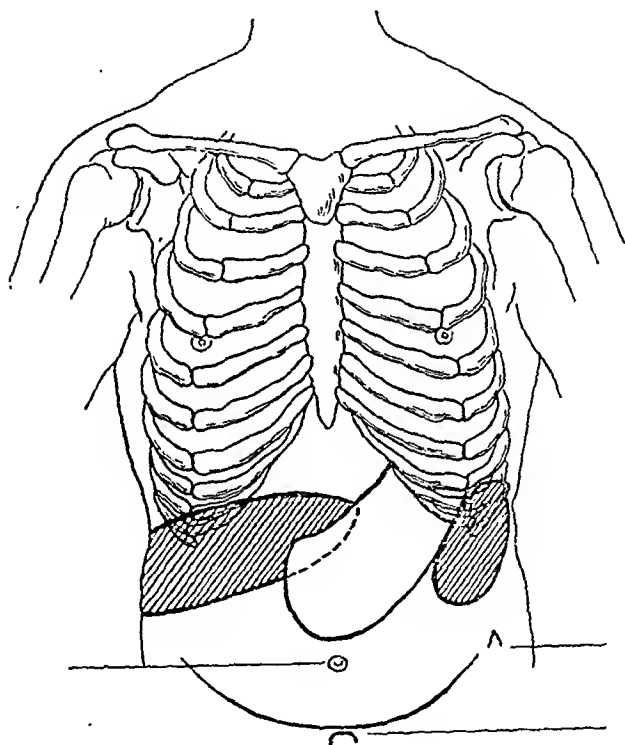
The stomach-tube was introduced and removed considerable undigested food which had remained in the stomach a number of hours; and in washing out the organ it was found to hold two and one-half litres without difficulty. The stomach-contents contained slight excess of free hydrochloric acid, and showed lactic acid to Uffelmann's test.

The patient was placed upon a dry albuminous diet and was ordered lavage of the stomach and regular colonic douches. His condition steadily but slowly improved, and after six months he had gained materially in weight and general appearance. The physical examination of the stomach showed that the pylorus had resumed a more natural position, and the lower border had receded considerably from its former position on the level of the umbilicus. Vomiting had almost ceased, and lavage discovered no remnants of food after six hours.

The patient was finally discharged from the hospital, having gained twenty-three pounds in weight and having a comparatively healthy appearance.

CASE VI. *Enteroptosis; displacement of stomach, liver, and spleen; stomach outlined by auscultatory percussion.*—Mrs. B., aged forty-five years; housewife; admitted November 25, 1894. The history obtained was as follows: her father died at the age of eighty-eight years of heart disease; her mother at seventy-seven years of pneumonia. She had two brothers and one sister living and in good health. One brother had died of pneumonia, one of typhoid fever, and one sister in infancy. She herself had been a healthy child and woman; she had had the ordinary diseases of childhood, but not severely. At nineteen she was married, and she had borne nine children. There was one miscarriage at the fifth month. All of her children were large and the labors were difficult. One child weighed sixteen pounds and was delivered with the forceps. The menopause occurred two years ago, since which time she has been growing stout; about the same time she noticed a tumor in the right side of the abdomen. This was moderately painful, and changed its

FIG. 5.



position with different positions of the body. A little later she suffered with pains in the left side, and then noticed a tumor there. When stooping she frequently had sharp pain in the right side, but she has never had any spontaneous paroxysms. She has been moderately jaundiced several times. At times there are shooting-pains around the left side, sometimes extending as far as the left arm, and occasionally she has suffered with attacks of palpitation. She has had attacks of abdominal colic severe enough to produce semi-collapse; and not rarely, after eating, has a feeling of over-distention. The bowels are occasionally loose. She kept on with her housework despite her suffering until four weeks ago, when severe pains in her left side and in the left shoulder compelled her to give up. Shortness of breath, which has always been present to some extent, still persists, and she has a troublesome morning-cough.



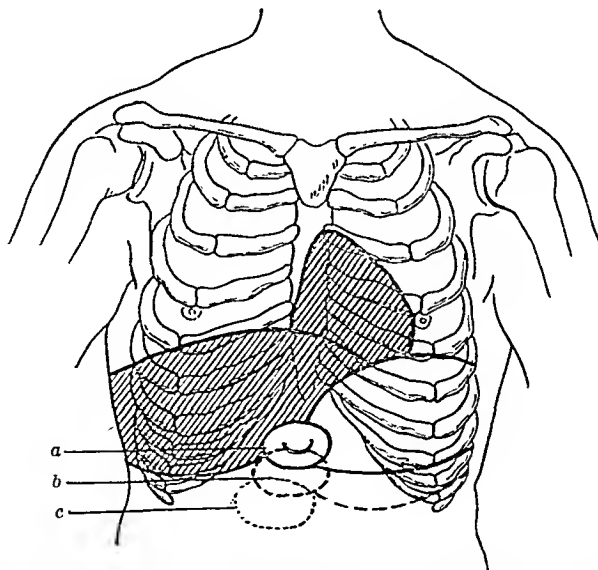
*Physical examination.* The patient is a very large woman, the subcutaneous fat being enormously increased but rather flabby. The abdomen is large and pendulous, so that the umbilicus is greatly depressed and the abdominal fold hangs down over the pubes. There is no fluctuation on careful bimanual palpation. The liver is plainly felt on the right side, the lower edge being 15 cm. below the border of the thorax, and the organ is easily movable up and down and laterally. On the left side the spleen is similarly displaced, the lower margin being 9 cm. below the ribs in the anterior axillary line.

Percussion discovers hepatic dulness 2.5 cm. below the edge of the ribs and extending downward 15 cm. and inward as far as the nipple-line. The position and the outline of the stomach were determined by auscultatory percussion. The area of tympany is on a level with the lower margin of the ribs. The lower margin is almost on the line of the anterior superior spines of the ilium. The umbilicus is displaced downward even below this point on account of the pendulous character of the abdomen. Posteriorly no difference could be detected by palpation or percussion of the two renal regions, though there were perhaps less resistance and dulness than normal on both sides.

Examination of the urine showed specific gravity 1030; pale amber color; no albumin; no casts; 1.3 per cent. of sugar. During her stay in the hospital the quantity of urine varied from forty-eight to fifty-eight ounces. Her temperature was about normal. Her pulse and respiration varied slightly from the normal. Examination of the blood showed 4,600,000 red corpuscles, 20,000 white corpuscles, and 60 per cent. hæmoglobin.

CASE VII. *Cancer of pylorus and liver; position of the growth and absence of dilatation determined by auscultatory percussion.*—D. C., aged forty-eight years, miner, was admitted to the hospital February 8, 1896. The patient's health had been good, though he had suffered with a number of lesser ailments.

FIG. 6.



a. Ordinary position. b. Position on full diaphragmatic inspiration. c. Position when lying on right side. The last position is somewhat exaggerated in the diagram.

He had used alcohol freely, but was not a daily drinker. He chewed tobacco excessively. He was a rapid eater and habitually bolted his food. There was no venereal history.

When he entered the hospital he asserted that he had been entirely well

until three weeks previously, when he was suddenly attacked with a severe pain in the abdomen. This was unaccompanied by vomiting or other symptoms and lasted about two hours. The next night another attack occurred, and subsequently they grew more frequent, coming on several times a day. The pain was generally sharp and cramp-like in character.

On physical examination there was found a large tumor occupying the mid-epigastric region and seemingly connected with the lower border of the liver. This was somewhat movable with the respirations and could also be moved from side to side.

Auscultatory percussion of the stomach showed that the pyloric end lay posterior to the mass, and the size of the organ seemed rather restricted than enlarged. With change in position of the patient the position of the tumor and of the stomach-tympany was also somewhat displaced.

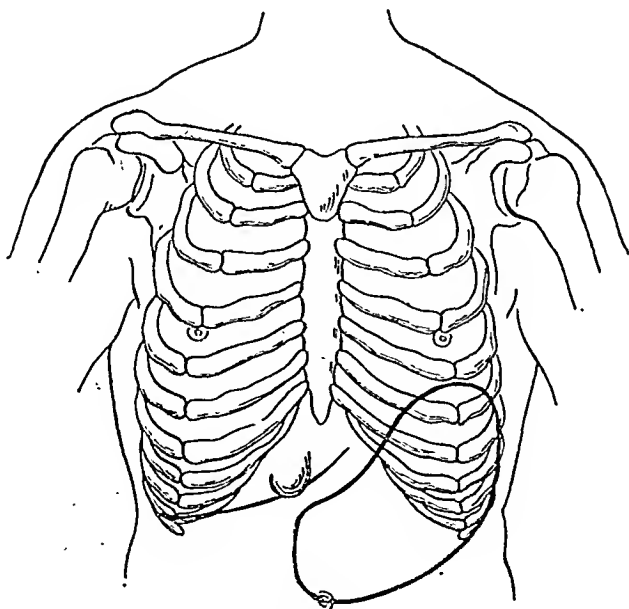
Examination of the stomach-contents revealed no remnants of food in the morning or at long intervals after eating. The acidity was reduced, varying from 26 to 42. Free hydrochloric acid was repeatedly discovered, the quantity varying from 15 to 20.

The urine was clear, with a specific gravity of from 1017 to 1025, acid in reaction, and containing some albumin—at times considerable, at other times little. An excessive amount of globulin over serum-albumin was striking. There was no sugar. Hyaline and granular casts and abundant leucocytes were found in the sediment.

The growth of the mass seemed progressive, and finally it was determined to make an exploratory incision. This discovered that the tumor occupied the position between the border of the liver and the stomach, being attached to both. The stomach itself was not enlarged and occupied the position determined by auscultatory percussion.

**CASE VIII.** *Tumor of the liver; chronic gastritis; pyloric involvement excluded by auscultatory percussion and inflation; subvertical position of stomach.*—N. C. C., aged sixty-five years, a hotel-keeper, was admitted to the hospital July 18,

FIG. 7.



1895. He had always been a healthy man, but never worked hard. He used tobacco excessively until two years before, but drank only moderately. He ate very irregularly, and constantly bolted his food without mastication.

In April of 1894 he began to lose weight and suffered with a dry cough.

The loss of weight went on steadily until it amounted to fifty pounds. He became weak and sallow in color; his appetite varied, sometimes becoming ravenous. His bowels acted irregularly, but he was rarely constipated. Occasionally he vomited, but lately not at all. There was practically no pain.

*Physical examination.* The patient is emaciated, sallow, and almost cachectic. The abdomen is rather hollowed, and in the position of the lower border of the liver is seen a distinct, nodular tumor which moves with the respirations. Auscultatory percussion determined that the pylorus lies near the tumor in question or behind it. The liver begins at the fifth interspace and extends 3 cm. below the edge of the ribs. The hepatic dulness is continuous with that of the tumor noted.

The stomach-contents were removed after a test-meal, and hydrochloric acid was found present. Subsequently this test was repeated on numerous occasions, and generally there was found a slight amount of hydrochloric acid. Sometimes it was absent. Boas's test-meal was given on three occasions, but lactic acid was always absent. There never was any evidence of retention of food beyond the normal length of time, and the stomach was always empty in the morning before breakfast.

Examination of his blood showed 4,125,000 red corpuscles, 12,500 leucocytes, and 45 per cent. hæmoglobin. The red corpuscles were irregular in shape, but there was no marked abnormality.

The urine was normal in color, acid in reaction, and had a specific gravity of 1018. There was no albumin, no sugar, and no casts.

The stomach was distended with air on several occasions, and it was found to occupy the position seen in the diagram. The lower border was as low as the umbilicus, but the pylorus was also depressed, so that the descent of the lower border was more likely the result of dislocation than of dilatation. When the stomach was inflated it was easy to determine that the mass on the right side was not connected with the pyloric end, as the latter was separated by a distinct and easily determined interval from the tumor in question.

The patient was placed upon a tonic treatment, and was ordered careful diet and remedies directed to the general disturbances of his stomach, supposed to be the result of chronic gastritis.

There was some improvement for a time, but subsequently the condition relapsed. Finally operation was decided upon, and was performed by Dr. J. William White. The mass was found to be a nodular growth in the anterior surface of the liver and projecting also to a certain extent upon the posterior surface. The stomach was uninvolved. No portions of the growth were removed, but the wound was simply reunited. The patient subsequently improved almost without interruption, and when he finally left the hospital, three months later, had gained over twenty-five pounds in weight, and suffered no gastric or other disturbances.

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## THE IMPORTANCE OF A SYSTEMATIC MICROSCOPICAL EXAMINATION OF UTERINE SCRAPINGS AND OF EXCISED PIECES AS AN AID TO DIAGNOSIS, BASED UPON THE ANALYSIS OF ONE HUNDRED CASES.

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THE object of the present paper is to call attention once more to the advantages to be derived from a systematic microscopical examination of tissues removed from patients at gynecological operations. It has for some time been a matter of routine with me to preserve for microscopical

examination all structures so removed, the findings in each case being recorded regularly in a systematic way. The results thus obtained have been by no means without interest. While it is true that in perhaps a majority of instances the microscopical examination simply verified more or less completely the diagnosis which had been previously arrived at from a careful clinical study of the case, it has not infrequently brought to light evidences of the presence of a malignant tumor whose existence had by no means been suspected. On the other hand, in several instances the microscope has proved a suspicion of malignancy to be unfounded, and in ordinary benign cases has thrown much light upon the exact nature of the existing process. And, lastly, in a small number of cases the microscopical examination has proved of the utmost importance in that it has placed us in a position to recognize a malignant process in its very earliest stages, and while it was still possible to remove the growth completely by operation, before it had given rise to metastases, or had spread by contiguity or continuity to such a degree that all attempts at complete removal would have been useless.

The importance of a microscopical examination of scrapings from the uterine or cervical cavity, and in distinctly suspicious cases of deeper portions of the cervix, or, indeed, of the uterus itself, excised for purposes of diagnosis, does not, in this country, seem to have been as yet sufficiently appreciated. The difficulties in the way of a general application of the method, it is true, are somewhat formidable. Thus, in addition to the technique and experience necessary to make the results of the examination of value, the question of time has to be considered, so that the majority of busy surgeons will be compelled to delegate the work to a well-trained assistant or to a pathological colleague. In Europe, and especially in Germany and Austria, attached to the best clinics are a number of competent men whose duties as assistants include the making of such examinations, and gynecologists in this country have long been in the habit, in doubtful cases, of submitting specimens for microscopical examination to pathologists in whom they have confidence. The tendency to make these examinations as a matter of routine is gradually growing, and the aid to be derived from the microscope in apparently simple as well as in doubtful cases is becoming more and more appreciated.

There has existed in the past an idea, now, fortunately, becoming less prevalent, that the result of the pathological examination in a clinically doubtful case is never certain. This, I think, grew out of the unreasonable demand of the clinician that, when his own methods failed in establishing a diagnosis, the pathological appearances should always be pathognomonic. While, however, the most enthusiastic supporters of the microscope as an aid to diagnosis are the most ready to admit their inability to give a positive statement as to the malignancy or non-

malignancy in every case, this much at any rate can be asserted: in cases which are doubtful clinically the microscope will sometimes clear up the diagnosis absolutely, and were such instances met with only once in a dozen, or even in a hundred patients, the results obtained would more than repay us for the time and trouble spent in the systematic microscopical examination of every case. The technical procedures employed in this branch of work are simple and can be easily carried out by anyone who has been trained in the ordinary histological and pathological technique. The experience necessary to form a satisfactory judgment as to the evidence concerning the presence or absence of a malignant growth in a given case, or as to the nature of inflammations, hyperplasias, and other changes, is indeed considerable; but we may safely assume that modern gynaecologists will not grudge time spent in preparing themselves for this work. The field for original studies in this direction, in which all modern histological and micro-chemical methods are applicable, is very wide and attractive; but, leaving out all such considerations here, it is my aim in this paper rather to lay stress upon the importance of the more simple work and that which is done for purposes of diagnosis alone. For the sake of clearness it may be well to outline briefly the routine followed in my own work, in which I have the help of a pathological assistant.

*The Obtaining of the Material; its Preservation and Preparation for the Microscope.* In the majority of cases the material which is to be examined is that which is brought away by curetting the uterus. For purposes of examination this material possesses decided disadvantages as well as advantages.

The two main advantages are (1) the ease with which such material can be obtained, even from regions, such, for example, as the fundus of the uterus, from which a portion of tissue can be excised only with difficulty; and (2) because it gives an opportunity to study portions of the mucous membrane from many different areas. The chief disadvantages that may be mentioned are: 1. In only a few of the cases does one obtain any of the muscular tissue from the body of the uterus, and scarcely any of the tissue, whether mucous membrane or muscular tissue, from the cervix. 2. The sections are necessarily made up of very small pieces, thus rendering it possible to miss just the tissue for which we are searching. 3. Examination of the material removed by curetting from the cavity of the uterus is frequently less satisfactory than the examination of tissues excised directly from the wall. This objection, as will be mentioned presently, applies even more strongly to scrapings from the cervical canal. 4. In curetted particles one necessarily loses almost all idea of the topographical relations of the tissue under examination.

With reference to the cervix, I am of the belief that it is almost

an impossibility to obtain with the curette suitable material for microscopical examination. The mucous membrane adheres so closely to the underlying fibromuscular layer that it is almost impossible to separate it satisfactorily with any of the ordinary curettes. In order to examine the mucous membrane of the cervix it is always much better to excise a small wedge-shaped piece of tissue, which should include an appreciable portion of the suspicious growth, and, whenever possible, together with it a small portion of what is apparently healthy tissue. The piece excised should be of sufficient size to enable us to handle it readily and to recognize macroscopically its former relations. The incisions should be made sufficiently deep into the tissues of the cervix to include the bottoms of the glands, and should be carried some distance up the cervical canal. After the required portion has been removed the edges of the wound can be brought together by means of interrupted silk or catgut sutures.

If an immediate microscopical examination of the tissue is not demanded, the scrapings may be satisfactorily prepared as follows: 1. They are washed quickly in salt-solution or in cold water to free them from blood as thoroughly as possible. We have found that the addition of a small amount of sodium bicarbonate to lukewarm water facilitates this procedure very much. The tissues should not be permitted to lie in water or in salt-solution, however, as they will soon become macerated and unfit for examination. 2. The specimens are then placed in 50 per cent. alcohol for several hours. 3. They are transferred to 97 per cent. or to absolute alcohol. The former, as a rule, is sufficiently strong, and, although absolute alcohol is perhaps better, it has the disadvantage of being much more expensive.<sup>1</sup>

The more solid excised portions should be allowed to remain for from twenty-four to forty-eight hours in the stronger alcohol until they are perfectly free from water. If, however, they are comparatively large, it will be necessary to pass them previously through a number of alcohols graded from 50 per cent. to absolute alcohol, since it has been found that the transference of too large pieces directly from the 50 per cent. alcohol solution to absolute alcohol will cause them to shrink extensively, so that the various relations may be distorted. Thus, for example, we have found that the epithelial cells often become detached from their base of support. 4. The specimens are then usually placed in a mixture consisting of equal parts of commercial ether and alcohol, in which they are allowed to remain for twenty-four hours. They may then be placed in ether for twenty-four hours. This step, however, in our experience has proved to be unnecessary and may be omitted. 5. They are next transferred to a

<sup>1</sup> The ordinary 97 per cent. alcohol may be converted into nearly absolute alcohol by the addition of sulphate of copper from which the water has been dried off by heat, the alcohol being afterward decanted off as required.

thin solution of celloidin (of about the consistency of milk), in which they are allowed to remain for twenty-four to thirty-six hours. 6. They are then placed in thick celloidin (of the consistency of treacle) for from twenty-four to forty eight hours or even longer. By employing a solution of a consistency about midway between that of the thin and that of the thick solution we have often succeeded in preparing sections of endometrial scrapings with a single solution; but with portions excised from the cervix, or with pieces of relatively large size—over one centimetre square, for instance—it is advisable that they should be thoroughly saturated in both solutions. Instead of the ordinary celloidin, an excellent home-made substitute can readily be prepared by making ether-alcoholic solutions of photographers' fibre-cotton, which costs from about fifty cents to one dollar an ounce. 7. The specimens are next to be placed on small blocks made from wood, cork, paper, or glass. When dealing with uterine scrapings we usually place ten or twelve pieces on one block. 8. The "blocked" specimens are then allowed to remain for about fifteen minutes exposed to the influence of the air, until some setting and contraction of the superficial part of the celloidin have taken place. The blocks are then placed in 50 or 75 per cent. alcohol, and after several hours are ready to be cut with the microtome. When on the blocks and kept in the alcohol the specimens remain comparatively good for an indefinite length of time, although after some months, as a rule, sections which are taken from them do not stain so well as when they are cut shortly after the specimens have been prepared.

This "celloidin-embedding method" is in general use in the preparation of pathological specimens, and is for ordinary work preferable to all others. For "ribbon-sections," or serial sections in continuous bands, the "paraffin-method" must be employed. It may besides be objected that the celloidin-sections are also somewhat thicker; but certainly the after-handling of them is much easier and the method itself is simpler. Serial sections, though not in continuous bands, of course, can be made by the celloidin-method.

Some of the European gynecologists prefer to employ paraffin in preparing tissues for microscopical examination. The method is somewhat as follows: 1. The specimens are first hardened in absolute alcohol. 2. They are then placed for twenty-four hours in some solution in which paraffin is soluble. Chloroform, xylol, or an ethereal oil may be used for this purpose. 3. They are then saturated with paraffin, either directly by placing them in paraffin melting at 50° C. for twenty-four hours, or indirectly by permitting them to remain in an open vessel in a solution of paraffin in xylol at a temperature of 50° to 55° C., the xylol being gradually volatilized. 4. A small paper cell is prepared of sufficient size to hold the preparation and at the same time to allow considerable free space, which is first filled with melted paraffin of a slightly higher

melting-point. The specimens are then taken from the paraffin and placed in the cell in the desired position, hot needles being used for this purpose. The cell is then cooled either by exposing it to the air or by pouring cold water around it, after which the paraffin, which has now become a solid block, and which holds the preparation firmly imbedded in it, is removed from the cell and the sections can be cut with the microtome.

Besides alcohol for hardening and preserving tissues may be mentioned formalin, corrosive sublimate, and Müller's fluid. Formalin acts very quickly indeed in solutions even as dilute as 2 per cent., except in the case of mucous membranes, where even very strong solutions do not seem to harden tissues nearly so well as alcohol. It is especially good in dealing with gross specimens, and preserves the blood-cells in the sections. Formalin-tissues do not, however, stain satisfactorily in hæmatoxylin and eosin. The fumes are irritating and may produce an unpleasant and persistent coryza. With some individuals even in weak solutions it produces a peculiar dryness of the skin if allowed to come in contact with it for any length of time. The sensation which is thus caused is somewhat comparable with that following exposure to strong solutions of carbolic acid, but the effects are probably much more decided. Dr. Cullen, of the Johns Hopkins Hospital, advocates a formalin-method for rapidly preparing permanent sections.<sup>1</sup>

His method in brief is as follows: 1. The tissues are cut by means of the freezing-microtome. 2. The cut sections are placed in a 5 per cent. aqueous solution of formalin for from three to five minutes. 3. They are then placed in 50 per cent. alcohol for three minutes. 4. Then in absolute alcohol for only one minute. 5. Further treatment is carried out as with the ordinary celloidin-sections. Cullen advises that when possible the tissue should be hardened in a 10 per cent. formalin-solution for two hours before it is frozen and cut. He believes that this is of special value in preparing scrapings from the uterine cavity. The first method occupies about fifteen minutes, while the second consumes an additional two hours. Cullen says that by the latter method the blood in the tissues is partially retained and will stain to some extent, but not wholly satisfactorily. Personally we have not had any experience with this second method, but we propose to employ it in the near future. As was said before, the rapidity with which it penetrates and hardens the tissues makes formalin of special value in the preparation of gross specimens.

*Corrosive Sublimate.* A saturated solution in normal salt-solution fixes tissues well, if minute particles only are used. After being fixed the tissues are further hardened in alcohol. The metallic deposits may be

<sup>1</sup> The full description of this method, which is one of the most valuable recently introduced, is to be found in the Johns Hopkins Hospital Bulletin, No. 49, April, 1895.



removed from the sections with tincture of iodine, and this in turn with 80 per cent. alcohol.

*Müller's Fluid.* The action of this fluid upon tissues is so slow that in the preparation of small tissues it is advisable to use other agents for fixing and hardening. It requires several weeks to harden small objects in Müller's fluid, and the fluid must be frequently changed.

When it is necessary to make an immediate examination of tissues it is best to cut the tissues into sections by means of the freezing-microtome, or better still, perhaps, to follow out Cullen's suggestion. It is to be remembered that only thin fragments are suitable for the freezing-microtome.<sup>1</sup> It is hardly necessary to mention that alcoholic specimens will not freeze unless the alcohol is first removed from them.

Although in normal histological work it is especially desirable to make thin sections, moderately thick ones can, as a rule, be utilized for pathological examinations. We have been able to obtain at times very thin celloidin-sections by properly diluting or strengthening the alcohol which is employed in keeping the knife and specimen moist. We find, however, that absolute alcohol is not to be recommended, as it will render the celloidin sticky, and may even dissolve it. About 85 to 90 per cent. is the limit of strength which should be employed for this purpose. The sections which are cut away may be removed from the knife-blade either with the flat of the finger, or, better still, by means of a moderate-sized camel's-hair brush, which may also be employed to keep the knife and specimens wet. These sections when cut are put into the 75 per cent. alcohol, and are now ready for staining.

*Staining of Sections.* A great variety of staining-methods are in use, but for ordinary pathological work in gynæcology a few simple stains suffice. Much can be learned as to "form-relations" from the study of unstained specimens; but for finer histological changes staining with one or more dyes is highly desirable. Delafield's hæmatoxylin alone or in conjunction with eosin as a counter-stain yields excellent results, especially if acid alcohol be used as a differentiating fluid. Carmine, picro-carmine, and Van Giesen's mixture are valuable general stains. For demonstrating bacteria in specimens the four following methods<sup>2</sup> are the most common in use for purposes of diagnosis: 1. Gram's method, either simple, or Gram's method with previous staining with picro-lithium carmine. 2. Weigert's fibrin-stain, which stains many forms of bacteria, fibrin, hyaline, and sometimes elastic tissue. 3. Carbol-fuchsin. 4. Methylene-blue.

<sup>1</sup> An excellent description of the technique of the freezing-microtome will be found in Friedländer's *Microscopische Technik* or Kahlden's *Histologische Untersuchung*.

<sup>2</sup> These methods are fully described in the books on microscopical technique.

*The Clinical Records of the Cases.*

In order to enhance the value of the microscopical examinations I have made it a rule to keep parallel clinical protocols of the cases, paying particular attention to the following points:

Name, age, social condition, residence, color, occupation.

Number of labors, whether instrumental or not. Age of oldest and youngest child; character of puerperia.

Miscarriages or abortions; at what period of pregnancy. Any possible sequelæ.

Menses. Age at first appearance. Regularity; amount; duration; whether painful or not. Date of last menstrual period.

Leucorrhœa; whether present or not. Character of discharge, whether irritating or not; color and amount.

Micturition; any disturbance noticed by patient.

Bowels. Usual condition; general effects of laxatives and purgatives.

Family history.

Personal history.

Patient's chief complaints; *i. e.*, those subjective symptoms which led the patient to present herself for treatment or diagnosis.

Present condition, embracing a thorough physical examination.

Examination of urine, chemical and microscopical.

Results of the examination: (1) without anæsthesia, (2) under anæsthesia.

*The Histological Protocols.*

In studying the sections particular attention is paid to the following points, and the results are recorded:

1. *The superficial epithelium; i. e.*, the layer of epithelium lining the cavity of the uterus.

Character of cells:

Ciliated or not.

Single layer or multiple layers, etc.

2. *Utricular glands:*

Course.

Length.

Size.

Lumina.

Shape.

*Glandular epithelium.* Character of cells:

Ciliated or not.

Single layer or multiple layers.

3. *Stroma.* Size of cells. Physical characteristics.*Different sorts of cells:*

Lymphoid.

Ovoid or round.

Fusiform or spindle.

Peculiarities in arrangement of cells.

4. *Vessels.* Those near the superficial mucous membrane, and those further away from the surface.5. *Muscular tissue.* If present or not; and if any peculiarities noted.6. *Cervical tissues.* If present or not; and if any peculiarities noted.7. *Histological Diagnosis.*8. *Notes or Remarks.*

In this way it will be seen that the careful clinical history which is taken of the cases and the histological findings are made to supplement one another. A discussion of the many different points to be considered in the diagnosis of the specimens is impossible in the present paper. Fortunately, however, we now have at our disposal a rich literature upon the subject, and especially worthy of mention in this connection are the work of Ruge and Veit on *Uterine Carcinoma*, Abel's *Technik und Diagnostik in der Gynäkologischen Praxis*, and the section of Orth's *Pathology*, entitled "Weibliche Geschlechtsorgane."

TABLE I.

		Normal endometrium.	Endometritis glandularis.	Endometritis interstitialis.	Endometritis glandularis et interstitialis.	Endometritis post partum sive post abortum.	Adenocarcinoma.	Squamous carcinoma.	Sarcoma.	Material insufficient, or diagnosis doubtful, or malignancy doubtful.
Total cases . . . . .	100	22	31	24	5	8	2	3	0	5
a. Cases in which clinical symptoms pointed to benign disease. Microscope showed absence of malignant disease . . . . .	67	17	20	15	4	7	...	...	...	4
b. Cases in which clinical symptoms pointed to benign disease. Microscope showed presence of malignant disease . . . . .	2	...	...	...	...	...	...	2	...	...
c. Cases in which clinical symptoms pointed to malignant disease. Confirmed by microscope . . . . .	2	...	...	...	...	...	1	1	...	...
d. Cases clinically suspicious as to malignancy; microscope showed undoubted malignant disease . . . . .	1	...	...	...	...	...	1	...	...	...
e. Cases clinically suspicious as to malignancy; microscope showed absence of malignant disease . . . . .	28	5	11	9	1	1	...	...	...	1

TABLE I.(a)—CLINICAL SHEET.

	Normal endometrium.	Endometritis glandularis.	Endometritis interstitialis.	Endometritis glandularis et interstitialis.	Endometritis post partum sive post abortum.	Adenocarcinoma.	Squamous carcinoma.	Sarcoma.	Material insufficient, or diagnosis doubtful, or malignancy doubtful.
Pain absent . . . . .	3	1	2	1	2				
continuous . . . . .	3	2	4	...	...	2	2		
intermittent . . . . .	15	27	15	4	4	...	1	...	5
worse at periods or on exertion . . . . .	11	19	11	3	5	1	1	...	5
lancinating or sharp . . . . .	4	9	10	2	1	1	2	...	4
dull or boring . . . . .	10	21	9	3	3	1	1	...	1
limited to pelvis . . . . .	17	29	19	4	4	1	2	...	5
headache . . . . .	3	6	2	...	...	...	...	...	1
backache . . . . .	12	21	11	5	5	1	1	...	3
Discharge, moderate . . . . .	7	13	11	4	5	1	...	...	2
absent . . . . .	2	8	5	...	...	...	2	...	1
profuse . . . . .	13	10	8	1	3	1	1	...	1
Menses, amenorrhœa . . . . .	2	...	1	...	1	1	...	...	1
too frequent . . . . .	3	6	6	2	...	1	1	...	1
too infrequent . . . . .	2	3	4	1	1	...	2	...	3
regular . . . . .	15	22	13	2	6	...	...	...	1
scanty . . . . .	5	6	6	1	1	...	2	...	1
profuse . . . . .	9	17	8	3	3	1	1	...	2
normal in amount . . . . .	6	8	9	1	3	...	...	...	1
normal in duration . . . . .	10	18	12	1	2	...	1	...	2
too long in duration . . . . .	6	10	6	3	5	1	1	...	1
too short in duration . . . . .	4	3	5	1	...	...	...	...	1
painless . . . . .	10	13	7	1	2	...	2	...	2
painful . . . . .	10	18	16	4	5	1	1	...	2
with clots of blood . . . . .	3	5	3	2	3	1	1	...	1
Metrorrhagia . . . . .	2	3	...	1	5	2	1	...	3
0-parous women . . . . .	10	16	12	4	3	1	...	...	2
Parous women . . . . .	12	15	12	1	5	1	3	...	...
Abortion diagnosed clinically . . . . .	...	...	...	...	2	...	...	...	...
Results of treatment :									
cured . . . . .	1	...	...	...	...	...	1	...	2
benefited permanently . . . . .	14	20	18	1	8	...	1	...	3
temporarily . . . . .	7	10	6	3	...	2	1	...	...
unimproved . . . . .	...	1	...	1	...	...	...	...	...
died . . . . .	...	...	...	...	...	...	...	...	...

CONCLUSIONS. A study of these tables, in which the results of the parallel examinations of 100 cases have been systematically arranged, reveals a number of interesting points.

Thus, in Table I., it will be seen that of 100 cases the question of malignancy or benignancy could be settled in 95. In 2 cases which clinically appeared to be benignant, positive and timely evidence was given of malignancy by the microscopical examination. In 2 cases in which the clinical symptoms pointed to malignant disease the microscope enabled us to confirm the clinical diagnosis beyond all doubt. In 1 case in which there was clinically at least a warrantable suspicion of malignancy the microscope changed the condition of suspicion to one of certainty. In 26 cases in which the clinical symptoms rendered the suspicion of malignancy at least warrantable the microscopical examination proved the absence of malignant disease. In 63 cases in which the clinical symptoms pointed to a benign disease the microscopical examination confirmed the clinical diagnosis or showed a normal endometrium.

TABLE I.(b)—HISTOLOGICAL SHEET.

	Normal endometrium.	Endometritis glandularis.	Endometritis interstitialis.	Endometritis glandularis et interstitialis.	Endometritis post partum sive post abortum.	Adenocarcinoma.	Squamous carcinoma.	Sarcoma.	Material insufficient, or diagnosis doubtful, or malignancy doubtful.
Superficial epithelium:									
wanting, or insufficient for diagnosis	2	3	..	1	1	2	2	..	2
single layer	20	26	24	4	7	...	1	...	3
multiple layers	...	2	2	...	...	...	...	...	...
high columnar	16	19	15	2	...	...	...	...	3
medium columnar	3	8	6	1	3	...	1	...	...
low columnar or cuboidal	1	1	4	...	4	...	...	...	...
ciliated	17	24	15	3	2	...	1	...	3
cilia not demonstrable	3	4	9	...	5	...	...	...	...
character of epithelium undetermined (not sufficient to judge from)	...	...	...	1	...	...	...	...	1
Utricular glands:									
wanting or material insufficient	...	...	...	...	1	...	1	...	1
course, tortuous or zig-zag	1	31	9	4	6	...	...	...	...
straight or nearly so	21	...	15	1	1	...	1	...	2
number, increased	...	18	4	1	2	2	...	...	...
normal	22	6	6	1	2	...	1	...	1
diminished	...	1	10	2	3	...	...	...	1
size of lumina, regular	17	...	4	...	...	...	1	...	1
irregular	5	31	20	5	6	2	...	...	3
shape of lumina regular	20	...	21	1	...	...	1	...	...
irregular	2	31	3	4	7	2	...	...	2
invaginated glands	8	21	13	2	...	...	...	...	...
Glandular epithelium:									
wanting or insufficient to judge from	...	...	...	...	1	...	1	...	...
single layer	22	28	24	5	6	1	1	...	5
multiple layers	...	7	3	2	3	2	...	...	...
high columnar	19	18	20	3	2	...	1	...	4
medium columnar	3	10	4	1	1	...	...	...	...
low columnar or cuboidal	...	3	...	1	5	2	...	...	1
ciliated	20	22	23	5	3	...	1	...	4
cilia not demonstrable	1	9	1	...	4	2	...	...	1
undetermined	1	...	...	...	1	...	...	...	...
Stroma:									
small round and ovoid cells with fusiform cells around gland lumina	20	27	13	3	5	1	1	...	4
round or oval cells, varying in size, some large, some small	1	4	7	2	2	...	...	...	1
bands of spindle-cells running through stroma	...	...	18	2	1	...	...	...	...
spindle-cell element in excess	3	1	23	3	2	1	...	...	...
cells crowded closely together	4	11	6	1	1	...	1	...	...
cells not closely packed together	1	4	4	...	1	...	...	...	1
lymphoid cells	12	13	12	1	6	1	2	...	2
polynuclear leucocytes	13	14	10	...	6	2	...	...	3
regularly distributed	3	6	3	...	2	...	...	...	...
grouped in spots	...	2	...	...	...	2	...	...	...
free red blood-cells numerous	14	18	12	3	3	...	...	...	1
few	4	5	4	...	1	...	...	...	2
decidual cells	...	...	...	...	8	...	...	...	1
Vessels, numerous	14	20	15	3	8	2	...	...	1
scanty or none found	8	11	9	2	...	...	...	...	4
dilated	10	16	13	3	8	1	...	...	2
collapsed	6	8	4	...	...	...	1	...	4
Muscle-tissue, present	4	4	5	...	1	1	1	...	3
absent	18	27	19	5	7	1	2	...	2
Corvical tissue, present	1	2	1	...	2	...	2	...	2
absent	21	29	23	5	6	2	1	...	3
Placental villi, chorionic or amniotic remnants	...	...	...	...	5	...	...	...	...
	22	31	24	5	8	2	3	0	5

In Table I.(a) the clinical symptoms met with in different conditions of the endometrium and in some few malignant conditions have been tabulated.

*Pain.* In 22 cases in which the microscope showed normal or approximately normal endometrium pain was absent in but 3 cases. This is a point we think worthy of some emphasis, inasmuch as it proves the possibility of the existence of painful affections referable to the uterus, in cases in which histological changes, at least by the methods ordinarily employed, are not demonstrable. In 31 cases of endometritis glandularis pain was absent in but 1 case. In 24 cases of endometritis interstitialis pain was absent in only 2 cases. In 5 cases of endometritis glandularis et interstitialis pain was absent in but 1 case. In 8 cases of endometritis post abortum sive partum pain was absent in but 2 cases. In the 5 malignant cases it was not absent in a single instance, and was generally continuous. In 30 cases of endometritis glandularis dull pain occurred in 21 and sharp pain in 9. In 19 cases of endometritis interstitialis dull pain occurred in 9; sharp pain in 10. In endometritis glandularis et interstitialis, 5 cases, dull pain occurred in 3 and sharp pain in 2. This would seem to show that in cases of glandular endometritis dull or boring pain is more frequently met with than sharp or lancing pain, while to a somewhat less extent the reverse is true in cases of interstitial endometritis. The pain complained of is in the great majority of instances limited to the pelvis or to the lower portion of the abdomen. We found this to be true in about 80 per cent. of cases. Headache is a rather infrequent symptom, being met with but 12 times. Backache is much more frequently met with, being recorded 61 times.

*Discharge.* In 22 cases in which the microscope showed normal endometrium discharge was absent in but 2 cases, and in 20 cases it was considerable in amount. In these cases the discharge probably originated from the cervix, and not from the body of the uterus; that is to say, the cases, or the majority of them, must have been instances of "cervical" endometritis. In 31 cases of definite glandular endometritis discharge was absent in 8 cases, or in nearly 25 per cent. This shows that leucorrhœa is by no means always present in such cases. In 24 cases of interstitial endometritis leucorrhœal discharge was absent in 5 cases, or in about 20 per cent. This is also interesting when considered together with the immediately preceding statement. In 8 cases of endometritis following abortion or labor a leucorrhœal discharge is noted in every case. In 2 cases of adenocarcinoma, one of the cervix, the other of the fundus of the uterus, a leucorrhœal discharge was present in both cases. In 3 cases of squamous carcinoma leucorrhœal discharge was absent in 2 cases, and was profuse in 1 case. In the two cases the disease being incipient, there were, in fact, no well-marked clinical symptoms such as would have rendered one even suspicious of a malignant condition. It

was only in the course of the routine examination of all tissues that the presence of a malignant growth was demonstrated. In the third case carcinoma could be diagnosed clinically, but the condition unfortunately had progressed too far to admit of a removal of the uterus.

*Menses.* Regularity. In the majority of cases the menses are noted as being regular. It is interesting to note that in 8 cases of endometritis after abortion, or after labor, the menses are noted as being regular in 6.

*Amount.* In 31 cases of glandular endometritis the amount was scanty in 6; profuse in 17; normal in 8. In 24 cases of interstitial endometritis it was scanty in 6; profuse in 8; normal in 9. We shall watch with interest the results in such cases in the future in order to see if the relations here presented be characteristic in these diseases. The table shows that in over 50 per cent. of cases of glandular endometritis profuse menstruation was met with, but in only 33 per cent. of cases of interstitial endometritis was the same condition found. In 8 cases of endometritis post abortum sive partum menstruation is recorded as profuse in but 3. In only one of the eight cases is amenorrhœa noted. Five of these eight patients are recorded as having the menstrual period of too long duration. Of the 2 cases of adenocarcinoma, one patient was past the menopause, being about sixty or sixty-five years of age. She had had a very trifling hemorrhage from the uterus previous to her admission into the hospital. This was the only symptom that the patient complained of; but she had been further told by her attending physician that there was no malignant disease of the uterus, and on physical examination alone nothing could be made out suggesting such a condition. As regards painfulness or painlessness of menses, pain seems to be more constantly present in the interstitial form of endometritis than in that of the glandular type; in endometritis interstitialis, 23 cases, the menses were painful in 16, painless in 7, with clots of blood noted altogether 18 times. Out of 8 cases of endometritis post abortum sive partum pain was present in 3 cases.

*Metrorrhagia* was noted twice in 22 cases in which the endometrium appeared to be normal on microscopical examination; three times in 31 cases of endometritis glandularis; in no instance in 24 cases of endometritis interstitialis; five times in 8 cases of endometritis post abortum, sive partum; twice in 2 cases of adenocarcinoma; once in 3 cases of squamous carcinoma. It is interesting to observe that in 8 cases of endometritis post abortum sive partum abortion had been diagnosed in but 2 cases. Exactly what proportion of these 8 cases were post abortum and what post partum I was unable to say, but three of the 8 cases are recorded as occurring in nulliparous women. In 1 case placental villi were found in a fairly well preserved condition nine months after the abortion was said to have taken place.

*Results of Treatment.* No deaths are recorded. Two cases are classed

as unimproved. In the majority of cases, 64, treatment effected a permanent benefit; temporary benefit was experienced in 32 cases.

Of the malignant cases, in 2 cases of adenocarcinoma temporary benefit was recorded. In one of these cases radical treatment was impossible on account of the local extent of the disease and the occurrence of metastases. In one case the age of the patient and her general condition compelled the writer to advise against any operation, although the disease was not advanced. One of the cases of squamous carcinoma reported as temporarily benefited has had a third operation for curetting and cauterization since, and is in a very precarious condition, the disease now involving the bladder and rectum. In the other two cases vaginal hysterectomy was performed over two years ago and the patients have been up to the present time free from any return, and are apparently in excellent health.

TABLE I.(b).<sup>1</sup> *Superficial epithelium.* In the majority of instances a single layer was demonstrated. Multiple layers are noted in two cases each of endometritis glandularis and endometritis interstitialis. We should say here in passing that the determination of the question whether a single layer or multiple layers are present is attended with a great deal of difficulty. One has constantly to keep in mind the readiness with which the appearance of multiple layers is produced by oblique section and by thick sections, so that considerable experience in interpreting the microscopical image is demanded. We cannot agree with some authors that a multiple layer of epithelium, either of the superficial or glandular type, is of itself a sign of malignancy. The appearance may be accounted for in several ways; it may be due, for example, to shrinkage and distortion of the specimen during preparation, to oblique and thick sections, and possibly to other causes. We believe also that, in the majority of instances where these external causes may be excluded, multiple layers denote merely a hyperplasia of the cells.

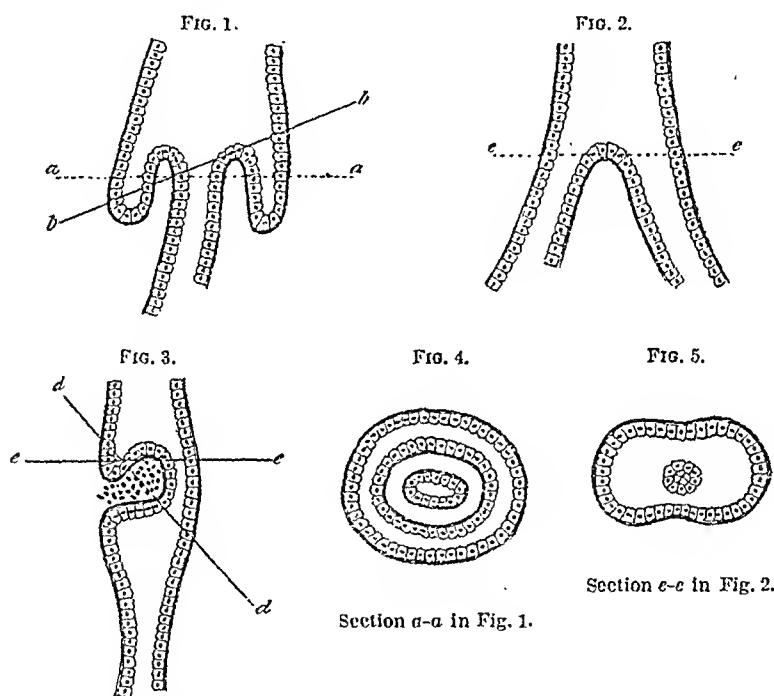
*With regard to the height of the cell,* Abel has pointed out that low or medium columnar cells are suspicious of pregnancy. Now, in eight of our cases of endometritis post abortum sive partum low or cuboidal epithelium is noted in four cases and medium columnar in three. This effect of flattening out the cells, which may indeed go so far that the superficial epithelium becomes changed into a sort of endothelial membrane with cells having more breadth than depth, and resembling endothelial cells very closely, is probably, though not entirely, the result of pressure. We have noticed similar flattening of cells in cases of ectatic glands and in cases of hydrosalpinx, where the pressure of the contents must have been greater than the usual pressure which is exerted upon the cells.

<sup>1</sup> From the Pathological Laboratory of the Western Reserve University.



*The presence or absence of cilia.* In the majority of cases cilia were found, their absence being recorded only 21 times. In 8 cases of endometritis post partum or post abortum they were demonstrated in but 2 cases and not demonstrated in 5 cases.

*Utricular glands.* A tortuosity of the glands, probably in the lower layer of the mucous membrane, seems to be an almost constant finding in cases of endometritis post abortum sive partum. There is also some irregularity in the size and more especially in the shape of the glands in these cases. Invaginated glands were found 8 times in 22 cases, where the endometrium had to be designated as normal; 21 times in 31 cases of endometritis glandularis; 13 times in 24 cases of endometritis interstitialis; twice in 5 cases of endometritis glandularis et interstitialis.



Section a-a in Fig. 1.

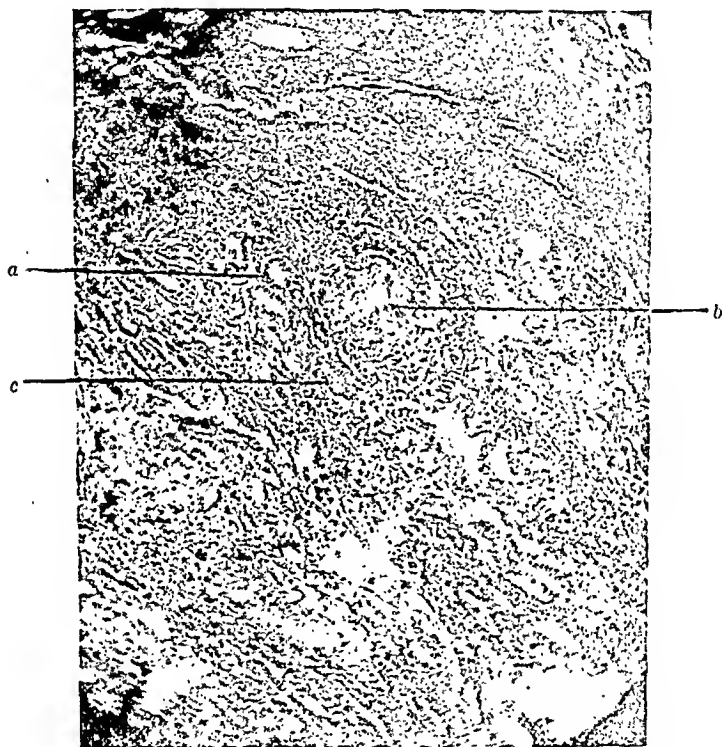
Section c-c in Fig. 2.

Invaginated glands or sections of lumina within lumina, or rather the appearance of such things in the microscopical section, may be produced in a variety of ways. A pictorial representation will illustrate this to better advantage than can be done in other ways. Fig. 1 represents a true intussusception or invagination of a utricular gland. Fig. 2 shows a uterine gland dividing dichotomously. Fig. 3 shows a papillary projection into the lumen of gland. The lines *aa* to *ee* represent sections. If these be made perpendicular to the plane of the paper, we should have somewhat the result pictured in Figs. 4 and 5. The papillary projections in Fig. 3 may appear somewhat diagrammatic, but we have seen just such a condition under the microscope.

*Glandular epithelium.* What has been said of the superficial epithelium holds true also for that of the glandular type. Multiple layers, however, are more frequently met with in the glands.

*Stroma.* The typical normal stroma may be said to consist of small round or oval cells, almost, but not quite, as small as lymphoid cells, all of about one size, with a single layer of fusiform cells round the gland lumina. These fusiform cells make the membrana propria for the glandular epithelium. They show the fusiform shape under the microscope,

FIG. 6.



Adenocarcinoma of the cervix uteri.

a. Gland-ducts, but little changed. b. Alveolus filled with flat cells. c. Atypical gland-duct.

but they are probably flat endothelial-like cells. We can readily understand this when represented pictorially. These cells which appear to be fusiform are in all probability only endothelial like cells, through which perpendicular sections have been made. In 20 of the 22 cases of normal endometrium and in 27 of the 31 cases of endometritis glandularis this condition was found. In 13 of the 24 cases of endometritis interstitialis, in 3 of the 5 cases of endometritis interstitialis et glandularis, and in 5 of the 8 cases of endometritis post abortum sive partum these structures could easily be made out. In all of these last 8 cases, however,

decidual cells were also found. It is interesting to note in this connection the behavior of the stroma-cells to staining with the different dyes. It was found when using the piero-earmine method that the nuclei of the small round and oval cells stained intensely with the earmine, while the cell-bodies, though taking on faintly the same stain, did not stain at all with the pierie acid. In other words, unless they are undergoing some degenerative process, no yellow tint could be seen in them. Blood-cells, on the other hand, whether free in the stroma or inside the vessels, stained intensely with the pierie acid. The cell-bodies stained with

FIG. 7.



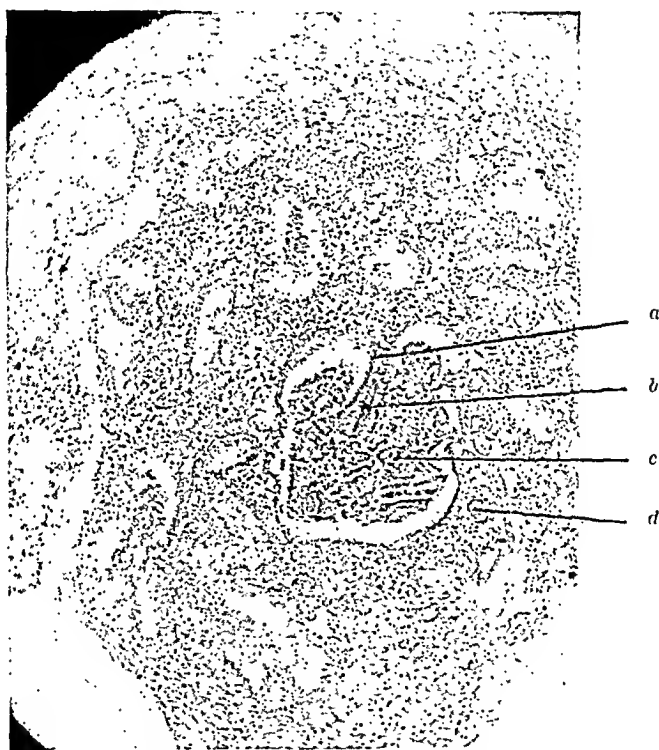
Decidual remnants and placental villi.

a. Placental villus. b. Large piece of decidua showing large decidual cells.

eosin, however, but faintly. Decidual cells took on the eosin-stain deeply, and one could recognize them even with low powers by the peculiar pinkish tinge of the section whenever they were present in sufficient numbers. In 7 cases of endometritis interstitialis out of a total of 24, and in 4 cases of endometritis glandularis out of 31 cases, the stroma-cells are noted as varying much in size, some being larger, some smaller than normal. Giant cells with many nuclei were seen in quite a number of the cases of endometritis post abortum sive partum.

The exact record of the number of times of their occurrence, unfortunately, has not been noted, but I can recall three instances in which they were found. In one case they were so numerous as to give rise to a suspicion of giant-celled sarcoma, there being at the time no clinical history of abortion or miscarriage, and the foetal structures not being positively demonstrable. The answers of the patient, however, upon being closely questioned as to the occurrence of an abortion, previous to her applying at the clinic, went to show that she had miscarried. Histologically the picture presented by the section under the microscope resembled closely that of a myosarcoma.

FIG. 8.



Papillary growth encroaching upon lumina of glands.

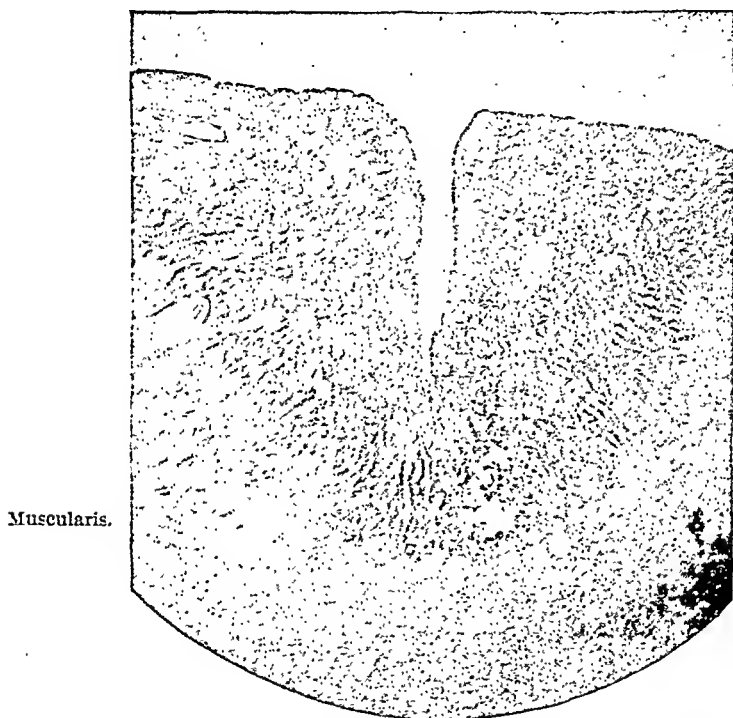
a. Pedicle. b. Foreign body. c. Complicated papillary growth. d. Bloodvessels.

*Bands of spindle-cells in the stroma* were observed 18 times in 24 cases of endometritis interstitialis, while the spindle-cell elements were found in excess 23 times. Very characteristic pictures in endometritis interstitialis are the concentric whorls of spindle-cells which form around the gland lumina. Instead of the normal single layer of spindle or fusiform cells, sometimes as many as ten layers may be seen. In many places these cells are seen to be compressing the gland, and the gland-

epithelium is undergoing degenerative changes, sometimes of the nature of simple atrophy, while sometimes active degenerative changes—*e. g.*, cloudy swelling or necrosis—have taken place.

*Polynuclear leucocytes* were found free in the stroma as follows: in 22 cases of normal endometrium, 13 times; in 31 cases of endometritis glandularis, 14 times; in 24 cases of endometritis interstitialis, 10 times; in 8 cases of endometritis post abortum sive partum, 6 times. Just what their presence signifies it is hard to say. In most of the cases they were found sparsely, but more or less regularly distributed, not being present

FIG. 9.



Endometritis glandularis hyperplastica.

The cleft in the middle of the section is part of the cavity of the uterus.

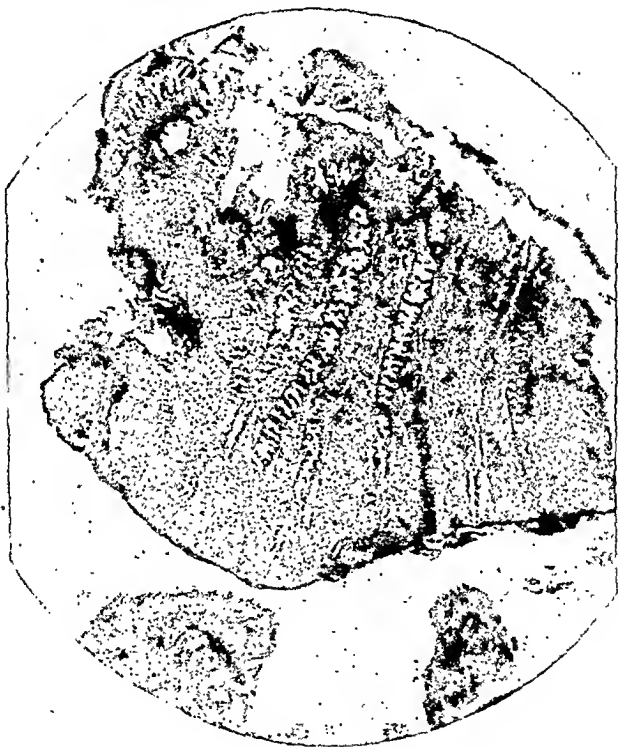
in great numbers and evidently not representing inflammatory infiltration. Their almost constant presence (in six out of eight cases) in cases of endometritis post abortum sive partum would seem to indicate that they are perhaps playing some rôle in the involution of the mucosa. It is evident, however, that their presence in the uterine mucosa (when sparsely and regularly distributed) is of no great pathological significance.

*Free blood-cells* were also frequently met with; in 22 cases in which the endometrium has been classed as normal, 18 times; in 31 cases of

endometritis glandularis, 23 times; in 24 cases of endometritis interstitialis, 16 times; in 5 cases of endometritis glandularis et interstitialis, 3 times; in 8 cases of endometritis post-abortum sive partum, 4 times. The explanation of their presence in such a number of cases with normal endometrium does not seem clear. What their rôle is, apart from the phenomena of menstruation, we do not understand.

*Decidual cells* were found in all the 8 cases of endometritis post abortum sive partum. True decidual cells were not found in any of the other conditions, though cells approaching them closely in size were often found in cases of interstitial endometritis.

FIG. 10.



Endometritis glandularis hypertrophica. Specimen obtained by curetting.

*Vessels.* No true arteries or veins are found in the superficial layers of the mucosa. Here the bloodvessels are all venous or arterial capillaries, the latter far outnumbering the former. In all 8 cases of endometritis post abortum sive partum the vessels were found dilated.

*Muscular Tissue and Cervical Tissue.* We desire to call attention especially to the infrequency with which muscular tissue and cervical tissue were met with. Muscular tissue is recorded as being present in but 19 cases. Cervical tissue is recorded as being present in but 11 cases.

The above table includes several cases in which sections were made

from the cervix, so that cervical tissue really was obtained by curetting even fewer times than would at first appear from the table.

FIG. 11.



Endometritis interstitialis. Specimen obtained by curetting.

*Placental villi, chorionic or amniotic remnants*, were found in 5 cases of endometritis post abortum sive partum. We are inclined to the opinion that, lacking a clinical history of abortion or pregnancy, it is impossible in many instances to make an absolute diagnosis of a foregoing pregnancy unless such foetal remnants be demonstrated. Their presence, however, must be considered, of course, as proof positive of a preceding pregnancy.

In conclusion, I wish to thank my assistant, Dr. Walter R. Lincoln, for valuable aid in the preparation of the tissues and in the laborious analysis of the cases.

The several micro-photographs illustrate typical microscopic findings in some of the cases to which we have referred.

## ANÆSTHESIA-PARALYSIS.

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THE discovery by which surgical operations were rendered painless is the fairest leaf in the rich wreath of laurels won by American surgery, ranging in its universality of application even above ovariectomy and ecphyadectomy.<sup>1</sup>

This blessing to suffering humanity, by which alone the gigantic strides of modern surgery have become possible, is, however, not free from danger. It was soon noticed that some patients, while being operated upon or even before the operation began, died. It was furthermore noticed that occasionally the extensor muscles of the forearm and the hand were paralyzed, a phenomenon that found an easy explanation in the arm having been allowed to roll out and hang in such a way over the edge of the table that protracted pressure was exercised on the region where the musculo-spiral nerve, after leaving the groove on the humerus, turns forward and becomes superficial at the lower end of the deltoid. This paralysis is in every respect analogous to that observed in a drunken man falling asleep with his arm hanging over the back of a chair; or in laborers carrying great weights on their shoulders; or after childbirth, when the patient is unable to use the muscles innervated by the peroneal nerve, that is to say—to bring the foot in dorsal flexion, to extend the toes, or rotate the foot outward—or unable to rotate the thigh inward or to bring it forward on account of a paralysis of the superior gluteal nerve, in both of which cases the paralysis is due to a pressure exercised on the lumbo-sacral cord where it passes over the brim of the pelvis and becomes compressed between the head of the child and the bone.

It is also a well-known fact that, if too much force is exercised in tightening the rubber tube or bandage used in Esmarch's bloodless method of operating, the patient is apt to wake up with a paralysis of the muscles supplied with nerves from the trunks thus exposed to injury.

But there are other kinds of disturbances in the functions of the nervous system connected with the administration of anæsthetics which have received little or no attention in this country, and only within the last two years have been described in Germany and France. When

<sup>1</sup> The terms *ecphyaditis* and *ecphyadectomy* are derived from *ecphyas*, the Greek name for the appendix vermiformis, and, being composed of purely Greek roots, are preferable to the hybrid formations *appendicitis* and *appendicectomy*.



I observed my first case of this kind nothing was yet written upon the subject. The phenomenon being entirely new to me, I was inclined to look for its causation in the great anæmia of the patient; but soon it became clear that pressure, at least, was an important factor in the production of the faulty innervation observed in such cases.

If we take into consideration that in my first case it took six months to cure the patient; that in some of those observed abroad the affection has lasted for years; that some patients suffer considerable pain; and that some have lost their lives from the effect of the anæsthetic, it is evident that we have to deal with a group of symptoms which are of considerable importance, which demand our serious study, and which we must, as far as possible, try to avoid.

Before going any further, I shall give the history of my cases. I am fully aware of the very imperfect way in which the nervous abnormalities have been examined and recorded; but, to begin with, I am not a specialist for nervous diseases; and, secondly, the nervous disturbances were in most cases of minor importance compared with the serious operations that had been performed on the patients. But, deficient as the histories are, they may still be available for calling the attention of others to the matter, who then from the beginning may observe similar cases more closely, or associate neurologists with them to investigate all involved questions more fully. These lines may also serve as a warning to the young men who usually are intrusted with the administration of anæsthetics, for, as we shall see later, the evil can in most cases be avoided by proper attention to the position of the patient during anæsthesia.

CASE I.—Mrs. R., aged forty-four years, Canadian, nullipara, was referred to me by Dr. R. W. Taylor. She had been suffering from menorrhagia for five years, and had been bleeding for six weeks when first seen. She was in a very anæmic condition. On February 17, 1893, I curetted her uterus, using ether as the anæsthetic, and Robb's leg-holder over the left shoulder. For the information of those who do not know this apparatus, I may add that it consists of a strong band of two layers of heavy muslin having in each end snaps that enter into iron rings sewn to the muslin. By this means the band is made to form a ring just above the strongly flexed knee, while the middle of the band goes in a slanting line behind the back and up over the left shoulder, which is padded with a folded towel or a layer of cotton.

Ether was administered by Dr. Leon F. Garrigues. The arms were flexed at the elbows and the hands rested on the sides of the face. The curetting stopped the bleeding effectually and permanently; that is to say, since then she has had normal monthly periods and was when last seen, some months ago, in good health.

When she recovered from the etherization her right arm, upon which there had been no kind of pressure, was lame. First the extensor side alone was affected, but later the flexor side was similarly implicated. She could not move the limb at all. The fingers were in a half-flexed

position, but could be passively extended. The whole extremity was somewhat swollen. Sensation was benumbed. Off and on she had some pain in the arm and the skin would become red in changing areas. Rubbing with spirit of camphor had no effect. Then faradization was employed daily, to which later was added massage. At the same time the system was built up with maltine, wine, iron, quinine, and strychnine. At the end of four months the arm and hand were yet a little weak. Then she went to the seashore, took baths, and returned at the end of six weeks perfectly well, both as to the paralysis and her general health.

CASE II.—Mrs. N., aged forty years, German, was seen by me in consultation with Dr. Fred. M. Bauer, transferred to St. Mark's Hospital, and operated on March 31, 1894. Ether was administered by Dr. Martin Schuh. The left tube and ovary, which were bound with fresh adhesions to the intestine, were freed and removed. In the right broad ligament was a hæmatoma reaching half-way up to the umbilicus. The coagulated blood was removed, an opening cut in the vaginal roof, and a T-shaped soft-rubber drainage-tube drawn up into the cavity in the broad ligament. The very brittle tissue was difficult to tie. The patient lost a good deal of blood, and the pulse became weak. A gauze drain was carried from the upper opening in the broad ligament out through the lower end of the incision in the abdominal wall. The patient made a good recovery.

It was discovered, we do not exactly know when, that her left arm was paralyzed. When she was out of danger in regard to her peritonitis and hæmatoma of the broad ligament the arm was treated daily with faradization. She left the hospital after a month, but came for some little time to continue the electrical treatment until she was well.

In this case the legs had been extended and no pressure had been exercised on the left shoulder.

CASE III.—Mrs. H., aged twenty-eight years, German. I performed double salpingo-oöphorectomy on her in St. Mark's Hospital on October 17, 1894. Ether was administered by Dr. Dann. The incision in the abdomen was just long enough to admit two fingers. There were no adhesions, and the inflamed and cystic ovaries were easily removed. The next day the whole left arm was found in a condition of semi-paralysis and the sensibility was much impaired. On the 29th—twelve days after operation—the arm was better but weak, and faradization was begun. She was discharged well, so far as the arm was concerned, on November 17th.

CASE IV.—Mrs. H., the same as Case III. The abdominal pain continuing, I removed her uterus by vaginal hysterectomy on January 21, 1895. Dr. Goldberg gave the ether. The patient did not lose much blood, but other difficulties caused the operation to last over two hours.

Three days elapsed before the patient complained of her leg. Then it was found that the whole left lower extremity was almost motionless, and that there was nearly complete insensibility of the area supplied by the crural nerve and also of that supplied by the sciatic nerve from the middle of the thigh down. There was also great tenderness at the seat of the crural nerve at the left groin, as well as of the great sciatic nerve, a little above the popliteal space, the first of which points corresponds to the place where the hip-joint is being strongly flexed and the latter to that where the bandage presses on the thigh while using

Robb's leg-holder. She was treated with faradization and soon got well.

CASE V.—Mrs. S., aged thirty-four years, German, always nervous, was subjected to vaginal hysterectomy by me, at St. Mark's Hospital, on October 21, 1895. Dr. Pfeuffer gave the ether. I used the clamp method, and had trouble in arresting a deep hemorrhage. The operation was tedious, and she lost much blood, so that she became nearly pulseless. When she came to, she complained of numbness of the right arm. She died of heart-failure the next morning. No autopsy.

The first to call attention to the paralysis sometimes following anæsthesia was Büdinger, assistant to the late Billroth's clinic in Vienna. He published in *Archiv für klinische Chirurgie*, Berlin, 1894, vol. xlvii. pp. 121-145, an article entitled "Ueber Lähmungen nach Chloroformnarkosen." He described nine cases, but says that by questioning the staff of other hospital-divisions he had found that these cases were not rare, but had so far not received any attention either from the surgeons or the neurologists.

As the subject is yet so new and little known in this country, I add a brief abstract of Büdinger's cases.

CASE VI. (I).—A woman, aged twenty-nine years, was operated on for carcinoma of the pylorus. Duration of operation two and one-half hours. Immediately after awakening, the right arm, which had been held upward during the operation, was found completely paralyzed. The arm was now found extended, the forearm in supination, and the fingers slightly flexed. She had no power to exercise pressure. Sensibility and reflexes were normal. The left pupil was twice as large as the right, which reacted slowly. There was no vasomotor disturbance. She died eleven days after the operation. There was no macroscopical or microscopical change to be found in the brain, the spinal marrow, or the nerves, but the roots of the brachial plexus were not examined.

CASE VII. (II).—Man, aged forty-four years. Extirpation of colon ascendens for carcinoma. Duration of operation one and one-quarter hours. The right arm was strongly extended in the shoulder-joint, and the elbow-joint was held at right-angles. Immediately after the operation there was complete paralysis of the arm and shoulder. The sensibility was diminished and the reflexes weakened. The patient died next day. No autopsy.

CASE VIII. (III).—An explorative incision was made on a woman, aged forty-six years, suffering from carcinoma of liver and stomach. Duration of operation one-quarter hour. The left arm had been held flexed at right-angles at the elbow-joint and extended a little beyond a right angle at the shoulder-joint. During the night following the operation the left arm was found completely paralyzed. The patient lived seven weeks, and at the autopsy there was found softening of the brain.

CASE IX. (IV).—On a man, aged twenty-four years, part of the intestine was resected on account of perityphlitis. Duration of operation two and one-half hours. The left arm was only extended a little beyond a right-angle during the anæsthesia, but when the patient awoke there was great weakness of the whole arm. The motions were

slow and imperfect. The patient died during the night. At the autopsy the brain was found very anæmic and somewhat moist.

CASE X. (V.)—Supravaginal amputation of uterus for a myoma. Duration of operation two hours. Both arms were tied to the upper part of the table, so that they formed angles of  $120^\circ$  with the thorax. The forearms were supinated. The next day the right arm was found paralyzed. All movements of the forearm were abolished; in the fingers slight flexion was possible. The shoulder could only be elevated very little. The sensibility was much diminished. Faradization. The limb was yet weak three or four months after the operation, but at the end of six months there was complete recovery and no atrophy.

CASE XI. (VI.)—A woman, aged thirty-one years, was operated on for a kidney-tumor. She was lying on the left side. The right arm was paralyzed and numb. Twelve weeks after the operation movements were yet slow and uncertain.

CASE XII. (VII.)—Woman, aged forty-three years. Hysterectomy for myoma. Arms held as in Case X. Complete paralysis of right arm. After six months the movements were yet slow and weak.

CASE XIII. (VIII.)—Female, aged forty-three years. Oöphorectomy for myoma. Duration of operation one and one-quarter hours. Arms held as in Cases X. and XII. The following day the right shoulder, arm, and forearm were found paralyzed. There was pain on pressure above the clavicle, not on the brachial plexus in the axilla. Hand and fingers were normal. The sensibility was diminished on the forearm. She improved, but the final result is not known.

CASE XIV. (IX.)—Woman, aged thirty-eight years. Resection of pylorus. Immediately after the operation the right arm was found paralyzed and insensitive from the elbow to the finger-tips. The right eye was the seat of a nearly complete amaurosis, which soon got better, but during a whole year she had double vision. A few weeks after the operation the right shoulder became painfully sensitive. In spite of electric treatment it took more than a year before the hand and fingers became somewhat movable and regained sensibility. Eighteen months after the operation the right palpebral fissure was smaller and the right pupil narrower than the left. There was some atrophy of the muscles. Two and one-half years after the operation she was nearly well.

Plaček,<sup>1</sup> of Berlin, has published the case of a woman upon whom laparotomy was performed for salpingitis. Shortly after awakening she complained of pain in the left arm. Next the muscles of the thumb and the interossei diminished in size. There was partial loss of electrical excitability, with the reaction characteristic of degeneration, diminished nervous irritability, and slow muscular contraction.

Franke,<sup>2</sup> of Elberfeld, had a case of a girl, nineteen years of age, who was laparotomized. Immediately after she came out of the anæsthesia the right arm was found completely paralyzed. There was loss of sensibility of the outer surface of the arms. The faradic reaction was normal. At the end of three months the paralysis remained and only a few movements were possible.

Vautrin,<sup>3</sup> of Nancy, has had three cases, two of paralysis of the

<sup>1</sup> La Médecine moderne, Paris, 1895, p. 193.

<sup>2</sup> La Tribune Médicale, July 17, 1895.

<sup>3</sup> Paralysies Chloroformiques. Médecine moderne, August 31, 1895, vol. vi. p. 572.

shoulder, and one of the face. The operations were performed for a small papilloma of the tongue, hydrocele, and a tumor of the breast. One of the patients took only very little chloroform.

In the discussion on Vautrin's paper Gross said there had been a fatal case after herniotomy in Strashurg. Hemiplegia developed in the evening. The autopsy showed a clot in the brain. In another fatal case there were found cerebral emboli.

Krumm,<sup>1</sup> of Worms, contributed four new cases from the clinic to which he is attached, and has written a monograph on the subject. Büdinger mentions three other cases of brachial paralysis happening after operation performed by Bardenheuer, Thelen, and Bernhardt.

In regard to the etiology of anæsthesia-paralysis, the cases may be divided into those of peripheral and those of central origin, the former of which are much more common than the latter. It is evident that the choice of the drug used as anæsthetic is without importance. In the French cases chloroform was used, in those occurring at Vienna either chloroform or A.-C.-E. mixture, and in my own ether alone.

While many of the cases have occurred after protracted operations, others, such as Büdinger's Case III., one of Vautrin's, and my own Cases I. and III., were observed after short and easy operations.

Loss of blood before or during the operation may be of some importance as a predisposing cause. Children and emaciated persons are more liable to be injured. But the real exciting-cause in the cases of peripheral origin is pressure. It appears from the preceding histories that the paralysis has been observed in the extremities, the face, and an entire half of the body. That of the arm is the most common. Büdinger has shown experimentally that this paralysis is due to pressure occurring between the clavicle and the anterior surface of the first rib, and bearing on the brachial plexus where it emerges between the scalenus anticus and medius. The pressure takes place when the arm is elevated alongside of the head, as often done during laparotomies performed in Trendelenburg's position, or brought out from the body as in amputation of the breast. Krumm found the pressure to take place between the clavicle and the transverse process of the fifth and sixth cervical vertebræ. Braun thinks that it is the head of the humerus that presses on the brachial plexus, just as the pulsation in the radial artery can be arrested by drawing the arm up.

Kron has shown on the cadaver that by elevating the arm backward and outward and simultaneously rotating it outward the median nerve is being stretched over the head of the humerus, and the same happens to the ulnar nerve when the forearm is flexed and strongly supinated. But there is hardly any doubt that in most cases of brachial paralysis

<sup>1</sup> Volkmann's Klinische Vorträge, No. 139. Leipzig, 1895. Ueber Narkosenlähmungen.

the pressure takes place as described by Büdinger between the collar-bone and the first rib.

The plexus is especially exposed to injury by this pressure if the nerves are stretched, which takes place if the head is drawn to the side opposite to that on which the arm is being elevated, or if the head is allowed to fall back.

Among my cases there are only two (Cases I. and II.) of complete paralysis, and that was seated in the right arm in Case I. and in the left arm in Case II. In Case III. the left arm was in a condition of paresis, and in Case V. a similar state had taken place in the right arm. For all these cases I adopt the explanation offered by Büdinger of more or less complete compression of the brachial plexus between the clavicle and the first rib. In Case IV. the left leg was the site of the affection, which is easily explained by the pressure exerted on the crural nerve at the inguinal fold and on the sciatic nerve at the posterior surface of the thigh just above the knee, in consequence of the cramped position in which the body is held by Robb's leg-holder.

In cases of pressure on the brachial plexus the upper roots—fifth and sixth cervical nerves—are more liable to be caught between the bones than the lower—seventh and eighth cervical and first dorsal. In such cases the paralysis attacks the deltoid, the brachialis anticus, the biceps, and the supinator longus muscles, while the other muscles of the extremity may escape. On the other hand, the muscles of the shoulder are implicated in some cases, their nerves coming from the same plexus.

If the lower roots are compressed too, the forearm and the hand are more or less paralyzed; but the less degree of pressure exercised on the lower roots explains that the paralysis is often less pronounced in these parts, and that motility returns sooner in the fingers than in those parts of the extremity which are situated higher up.

In a few cases there were disturbances in the eye: the palpebral fissure was diminished in size; the pupil was contracted; there was amaurosis, and later double vision. These ocular disturbances are, according to clinical and experimental studies, due to a lesion of the communicating branch from the first dorsal nerve, which is probably due to stretching or to neuritis.

There is also more or less disturbance in the sensory sphere. There may be complete insensibility or numbness. Sometimes there is spontaneous pain or tenderness on pressure. Sensitive points may develop in the course of nerves. They are attributed to chronic descending neuritis or myositis. In one of Büdinger's cases such a sore point could be felt on the deltoid two years and a half after the operation. The electric excitability is diminished, and the muscles are slow to contract.

When the upper roots alone are compressed there are less disturb-

ances in sensation. In the lighter cases of plexus-paralysis they are therefore rarely present; but in compression of the lower roots or when the whole plexus is involved, sensation is annihilated or obscured in the domain of the cutaneous branches of the ulnar, the internal cutaneous, the musculo cutaneous, the median, and the radial nerves.

It has been noticed that even when the muscles innervated by the circumflex nerve—the deltoid and teres minor—are paralyzed the corresponding skin retains its sensibility. In my first case there were swelling of the affected arm and appearance and disappearance of redness on changing areas of the skin, showing implication of the vasomotor nerves. In most cases the abnormalities in the motor or sensory sphere appear immediately; in others there is a gradual development. In some cases the paralysis has led to atrophy, but this seems more an exception than a rule.

Anæsthesia-paralysis of central origin is much rarer than that of peripheral origin, and is rather obscure. It may be due to cerebral apoplexy or emboli, either of which would produce ischæmia in the surroundings and secondary softening of the brain. People who oppose a violent resistance during the anæsthetization, and old people with arteriosclerosis, would be more liable to such occurrences. Or it may be due to a primary softening of the brain (see Case VIII.), directly brought on by the influence of the anæsthetic on the nerve-tissue, analogous to the acute nephritis often observed after long operations, which latter, however, soon disappears, and to the acute parenchymatous degeneration that has been found in the muscles, the heart, and the liver.

The paralysis of central origin appears as hemiplegia or hemiparesis; but it is not unlikely that so-called chloroform- or ether-death in some cases really is due to apoplexy. In this connection I may mention that one of my patients, an old woman, upon whom I operated for prolapse of the uterus, and who was under the influence of chloroform one hour, was seized with acute mania. The later developments of this case are unknown to me.

The differential diagnosis between central and peripheral cases is, as a rule, not difficult. In the peripheral cases the lameness corresponds to one or more nerves upon which undue pressure has been exercised, or to the brachial plexus. There appear sometimes hyperæsthetic points in the course of a nerve. The electric irritability is diminished, and the muscles contract slowly.

The prognosis is in the lighter cases good, both as to complete recovery and the time needed for a cure; in the more pronounced cases of plexus-paralysis it seems also to be good as to final result, but it may take many months or even years before a cure is effected. In the central cases the prognosis is, of course, much more serious and doubtful.

As to treatment, prophylaxis should first attract our most serious atten-

tion. Pressure on special nerves should be avoided, and the arms should never be raised above the head, but, so far as possible, rest in an easily flexed position on the chest. In using leg-holders the parts exposed to special pressure should be carefully padded with cotton-batting. The head should be supported on a pillow, and, if the patient vomits and the arm is raised, the head should be bent toward the arm, and not away from it. As to paralysis of central origin, we can hardly take any prophylactic measures beyond abstaining as far as possible from operating on very old persons, and abridging the duration of the anæsthesia as much as possible. In this respect it is often preferable, if several operations are needed, to operate in two sittings rather than to keep the patient too long under ether.

In regard to curative treatment electricity occupies the first place; but since it has been found that its application shortly after the operation is very painful, it is advisable to wait about a week before having recourse to it. All my cases have responded nicely to faradization. Krumm recommends to use galvanism and place the cathode on the point of lesion, and later to use labile and stabile electrization both above and beneath the seat of the lesion.

Besides electricity, massage and hydrotherapy are undoubtedly of some value. Among drugs strychnine is the most important, and may be given together with iron, quinine, arsenic, extract of red marrow, and a nourishing diet.

## A CASE OF DISTORTION OF THE AORTA IN POTT'S DISEASE.

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THAT the aorta is liable to distortion in Pott's disease is well known to specialists; but, if I am not mistaken, the fact is not generally familiar. It is partly for this reason that I venture to publish the following observation, and partly because I am not acquainted with any account of an equal distortion. Leon Bouchacourt<sup>1</sup> has recently published an account of a much less striking deformity in a child. I am indebted to him for the statement that the *Thèse de doctorat* of Tournisont, in 1887, inspired by Lannelongue, contains the results of previous works. It appears that the deviations of the aorta in Pott's disease are of five types. In the first, the most common one, the aorta simply follows the bend in the spine, presenting a sudden bend, making a V-shaped angle, open in front. In the second type the vessel is bent forward by

<sup>1</sup> Revue d'Orthopédie, Mai, 1895.



an abscess behind it, assuming the form of a C, open behind. In the third type the aorta is thrown to one side, making a C placed laterally. The fourth type, much more uncommon, shows a double lateral curve, so that it represents an S. The fifth type is a combination of more or fewer of the preceding types, being a series of complicated curves. So much for mere deviation. The following passage is from Hoffa:<sup>1</sup> "The aorta and vena cava can have their course changed . . . The folding of the vessels can lead to a considerable reduction of their lumen sufficient to cause an arterial anæmia of the parts below, or a venous congestion of the same. Vascular murmurs are heard when there is a marked narrowing. Lannelongue further points out that a dilatation of the aorta is likely to occur above the bent point and a narrowing below it. He would thus account for sudden and temporary paralyses."

The specimen about to be described came from the body of a white man, fifty-one years old, dissected during the past winter at the Harvard Medical School. The body was thin and ill-nourished. The deformity was very great, presenting a very sharp prominence in the middle of the back. On seeing the subject before dissection, I determined to study the relations of the œsophagus, but, unfortunately, forgot all about it under stress of other work, until I was called to see a remarkable arrangement of the aorta. The subject had by that time been thoroughly gutted, so that nothing else was left to study. I was told that a large abscess had been found in the left hypochondrium.

The deformity of the spine was a very great one, situated in the lower half of the thoracic and practically the whole of the lumbar regions. The point of the bend was at the last thoracic spinous process. The angle made by lines drawn through the centres of the vertebral bodies would not have been far from 35°. The length of the spine from the top of the odontoid to the coccyx in a straight line was 40.5 cm., to the promontory 23 cm. The average length to the promontory in the male spine is probably from 60 to 63 cm. I have found this measurement, in fifty of fifty-six male spines, to range from 57 to 66 cm.<sup>2</sup> This shows how great was the shortening. The length of the cervical region was 12.6 cm. (7 mm. below the average), and that of the sacrum and coccyx 17.5 cm., both being measured along the curves. The cervical vertebræ were normal, except for a slight twist to the right, which, perhaps, was not pathological. The same may be said of the bodies of the four upper thoracic vertebræ, and perhaps of the top of the next one. The lower part of the fifth is fused with the sixth, and thence the spine is one piece to the end. There seem to be some remnants of an intervertebral disk below the last lumbar, but they are slight, and the bone is certainly co-

<sup>1</sup> Lehrbuch der Orthopädische Chirurgie, 1891.

<sup>2</sup> Methods of Estimating the Height from Parts of the Skeleton. Medical Record, September 8, 1894.

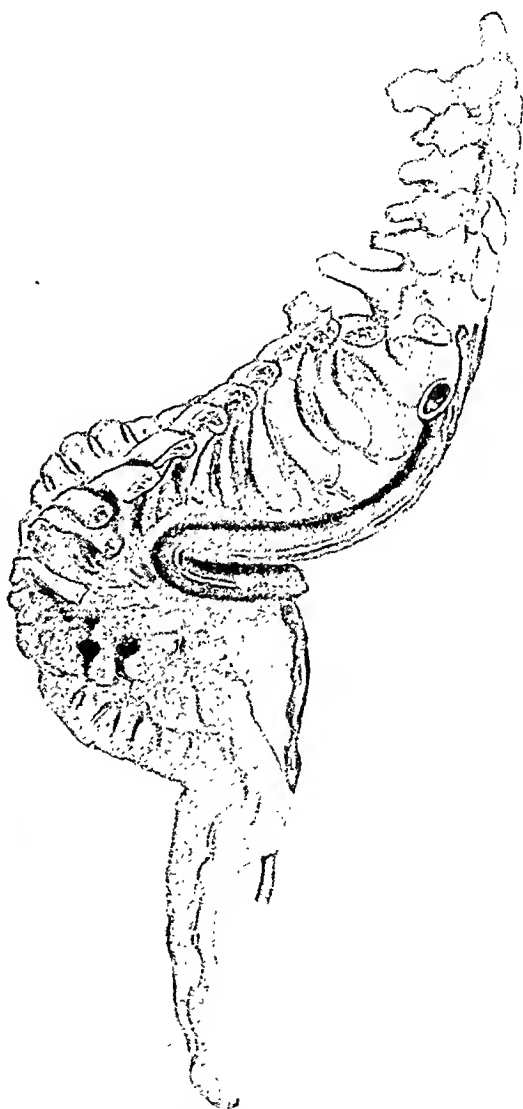
ossified with the sacrum. Owing chiefly to the severity of the lesion, but in part to the necessity of making a ligamentous preparation in order to preserve the aorta, the detail of the condition of the bodies of most of the vertebræ could not be ascertained. The body of the seventh

FIG. 1.



Front view.

FIG. 2.



View from the right.

The iliacs are hanging loose.

thoracic lay on that of the third or fourth lumbar, joined to it by bone. The intervening ones were indistinguishably fused into one mass, from the sides of which the ribs emerged. The upper lumbar and lower thoracic were deviated to the right, leaving a hollow, probably occupied

That the efforts at acclimatization have been successfully accomplished for the race, the "survival of the fittest," under all conditions of environment, bears abundant testimony; but that, in the effort, the individual has been abundantly sacrificed, the vast hordes that have succumbed to the various local causes of disease and death bear equal witness. Into the ranks arrive constantly new individuals in every community, who, from inherent or acquired vulnerability, find it impossible to live at peace with their environment; and, as their vulnerability exhibits itself in the form of actual disease, the question must arise, in the management of such an organism, Is it possible so to fortify him as to lessen his vulnerability and establish his resistance and enable him to battle successfully with his foe in his present environment? If not, if he, as an individual, cannot accommodate himself to his environment, can an environment be furnished which, accommodating itself to his requirements, will aid him in the struggle?

Around this question centre the efforts of the climatotherapist, and in the settlement or solution of it he finds certain difficulties, some of which I shall endeavor to place before you, in the hope that it will stimulate us to greater efforts to elucidate and simplify this somewhat complex problem, which is the especial object of our Association.

The chief difficulties which the climatotherapist encounters may perhaps be classed under the following heads:

1. The uncertainty of the composition of the agent.
2. Lack of sufficient data concerning many American stations.
3. Difficulty of choice for the individual case.
4. Lack of general information as to the elements of climate affecting health and the consequent lack of ability wisely to use the agent.

**THE UNCERTAINTY OF THE COMPOSITION OF THE AGENT.** If each health-resort had its climatic elements in fairly definite quantity, barring such variations as must be incident to changing seasons, climatotherapy would constitute one of the simplest and plainest of lessons. One could choose, by latitude or isothermal line, the amount of cold desired, and altitude and insular or inland location would do the rest; but, unfortunately, such is not the state of the case. "The wind bloweth where it listeth" now as in "ye olden time," and at least along seaboards its direction constantly modifies temperature, humidity, and barometrie pressure. So far as seaboard-resorts are concerned, therefore, only an approximate estimate of the climate to be anticipated can be made; so that our prescription may be only partially filled, and substitutions, much more serious than those which some pharmacists are said to make, may occur, so completely altering the effect as even to jeopardize life. Each of us can supply incidents from our own experience, some serious, some ludicrous, illustrative of misplaced confidence in climate. An intimate friend of mine sent a phthisical patient to

Marietta, Georgia, to remain during the winter months. She and her attendant arrived there the night before that frost, that "chilling frost" which extended even to Florida, with destructive effect on the orange-groves. The patient did not wait for further developments, but speedily returned North, where provision is made beforehand for that kind of weather; and thereafter had serious doubts about the wisdom of her medical adviser as to matters climatic. Only this winter I sent a convalescent to a noted Southern resort whose moderate altitude has been oftentimes vaunted as entitling it to be the "all-the-year-around" favorite. I sent her there that she might have more days of sunshine to ride or drive and otherwise recoup her vigor. A few days later, when the vicinity of Philadelphia was mild, pleasant, and open, I received a letter stating that, owing to the snow, they had been unable to enjoy as much out-of-door life as was desirable. They hoped, however, for better things, and, waiting, got them. When even Colorado Springs, that paradise for the phthisical, with Pike's Peak ever at her elbow to freeze any excess of moisture from her diathermic atmosphere, may lie "for seventeen successive days under a canopy of clouds," without a ray of sunshine to idealize her usually unexcelled "invalid's day," one can readily see that climatotherapy presents some problems not easy of solution. This difficulty, however, chiefly affects, to a serious extent, only those cases in which short doses of climate are prescribed. Taking the season through, a moderately fair estimate of the climate to be expected may be made; and this, after all, affects most of those cases in which it seems to be more particularly an essential element in the treatment. A convalescent sent for a few weeks to hasten recuperation to any resort, and especially seaboard-resorts, may stumble upon exceptional weather and be worse off than if he had remained at home; but the phthisical or the rheumatic who should go for a longer time, or for a permanent residence, will usually find, in the season through, that fair average or mean climatic condition which he seeks.

LACK OF SUFFICIENT DATA CONCERNING MANY, IF NOT ALL, AMERICAN STATIONS. Much has undoubtedly been already accomplished in this direction. The researches of Solly, Fisk, Denison, Ruedi, von Ruck, Orme, Remondini, and others have given us insight into this subject concerning some of our most noted and, perhaps, the most important stations for the climatic treatment of consumptives; but many others have been but imperfectly presented to the profession, and most of those of which we have records have furnished no comparative data, but chiefly the facts concerning one locality alone, giving us no comprehensive view of our climatic stations as a whole, as has been done for European stations by men of wide experience with the different localities.

Agencies are, however, at work in our own country which tend to modify climatic conditions and which necessitate continuous records in

order to enable us to prescribe climate wisely. The removal of large tracts of timber, the irrigation of extensive, almost deserted wastes, and the consequent abundant vegetation resulting, may vary greatly the humidity of a locality and modify decidedly the climatic conditions. Increasing population, producing towns and even cities in a few years, may modify, for better or worse, the pre-existing conditions. Railway facilities and desirable hotels and boarding-houses are annually bringing new resorts for our study, and the absence of the same place many otherwise most desirable and beneficial localities under ban. Climate, without good food and shelter from vicissitudes, counts for nothing to the chronic invalid in his battle with a mortal foe. The more important health-resorts in Europe have not this difficulty to contend with. Their established reputations, with ease of access and thorough adaptation to all of the needs, physical and social, of the invalid, remove this difficulty from the problem. Then, again, their climate is usually more stable, less subject to marked variations, owing to their altitude, like San Moritz and other Alpine stations; their background of mountain-range, like places along the Riviera, or their insular position, like Madeira. Time, with the devotion of the medical profession, has done for their resorts what it will do for those of this country. Meanwhile we must wait, and work while we wait. Our own Association, besides gathering from its widely scattered membership facts concerning the various stations throughout the country, has an energetic and conscientious committee gathering data which must greatly advance our knowledge of the climatic features at our disposal and place on a more definite basis the absolute facts concerning the different resorts, bared of the tinsel and glitter of hyper-enthusiasts. Professor Moore and Dr. Phillips, of the Government Weather Bureau, have begun, in their monthly issue of a pamphlet on *Climate and Health*, a work which will no doubt be elaborated as time goes on, and prove of incalculable benefit to the climatologist. This work exhibits the climatic conditions for the same period of time of almost a hundred stations scattered over the United States, giving their barometric pressure, temperature, humidity, rainfall, number of days clear, partly cloudy, cloudy and rainy, and the direction and average daily movement of the wind. It also gives reports from about one hundred and seventy-five stations as to the prevailing sickness in these different localities and their surroundings, which will undoubtedly prove of much benefit to the statistician of the causes of disease and the climatic conditions favoring their origin, spread, and mortality.

THE DIFFICULTY OF CHOICE FOR THE INDIVIDUAL CASE. This constitutes one of the most decided difficulties of the whole subject. It is, at this time, one of the most important points in climatotherapy. It applies alike to our European *confrères* and to ourselves. All therapeutics, however, presents the same difficulty. Remedial agencies of any

sort applied to apparently similar cases do not invariably bring about the same result. This is especially true of climates. Of two patients, apparently about equally affected with phthisis, and, so far as we can judge, equally promising under favorable conditions, sent to the same resort and subjected to the same care, one will improve—perhaps recover, and the other may continue uninterruptedly to grow worse, or, improving at first, may later rapidly or slowly decline. Williams tells us of twenty selected cases sent by the Brompton Hospital to Madeira for one winter. Only three improved, one died, and the rest returned to England worse than when they started; and yet these cases were carefully selected by the hospital staff as most likely to benefit by that climate.

Undoubtedly familiarity with the agent enables one to choose the suitable station with fewer errors than they can do who are less familiar with climatic effects. In my opinion the best elucidation yet presented on climatotherapy is to be found in the work entitled *Ærotherapy*, by C. Theodore Williams, published in 1894. He lays down propositions and conclusions from his most extensive experience which should greatly help the profession. Although his experience has chiefly been with what to us are foreign stations, he has had some acquaintance with a few of the more important of those of our own country, both through patients whom he has sent and also through a personal visit thereto. The principle that he establishes for the foreign resorts may serve as a foundation for a more rational climatotherapy with us, as the same or markedly similar climates to those which he has chiefly used are to be found within our borders.

LACK OF GENERAL INFORMATION AS TO THE ELEMENTS OF THE CLIMATE AFFECTING HEALTH, AND THE CONSEQUENT LACK OF ABILITY WISELY TO USE THE AGENT. The question paramount in most minds about to employ climate in a given case is, "What is the best climate for phthisical patients?" The question should ever be, "What is the best climate for *this* phthisical patient?" *There is no antibacillary climate habitable.* Climate is or may be a factor to aid in resisting disease by recuperating energies or by lessening causes of aggravation. It is a complex factor, variously compounded. It should be prescribed, as any other remedy is prescribed, with knowledge of its constituent elements and with forethought as to the effects of the especial combination and the especial ease at hand. The four elements of climate chiefly affecting health are: temperature; humidity, including sunshine; air-movement or wind; and atmospheric pressure, including altitude. As nearly as possible in a given case one should choose that place whose possession of these constituents in appropriate combination seems best calculated to induce a favorable result. The principal modifying factors of these constituents are due to: 1. Distance from the equator. 2. Height above sea-level. 3. Distance from the sea. 4. Prevailing winds. 5. Character of the soil.

It must be apparent that, in our vast extent of continent, bathed on its eastern and western borders by the principal oceans of the earth, extending through the breadth of the temperate zone, and possessed of mountains and plateaus so located as to insure to our patients altitude with such combination of desirable qualities as are unequalled even in the best of the Alpine stations, I repeat, with such factors for modifying climate we should be, and are, able to find within our own borders and on the islands adjacent all varieties from which to make selection. Our high-altitude stations are considered by most authorities as superior to those of the Engadine in many respects, one of which is the absence of wet soil from the melting of snow, it seeming to dry away, owing to the amount of sunshine and the character of the soil. The Engadine at the time of snow-melting, in the spring, is unfitted for consumptives, though they may return later with benefit. One objectionable feature in our Colorado climate is the dust, which makes it less desirable for irritative mucous membranes than is the Engadine, which, during the winter, is snow-covered. Apart from this feature, however, Colorado and New Mexico, running into Texas, present the climate *par excellence* for all cases of phthisis in which altitude is not contraindicated.

Dr. Holland, the English-speaking physician at San Moritz, agrees in the main with C. Theodore Williams and most of our own authorities as to the advantages and contraindications of altitude. The latter writer has formulated the following as his experience of the influence of altitude in phthisical cases:

"1. Enlargement of the thorax, unless opposed by fibrosis or by extensive adhesions.

"2. Males and females seem to do equally well, and profit most between the ages of twenty and thirty, males over thirty and females under twenty being benefited least.

"3. The climate is especially beneficial in hemorrhagic cases. (Holland considers that hæmoptysis is not a barrier to high-altitude treatment, so that this formerly supposed contraindication is losing supporters abroad as well as with us.) In hereditary cases it seems to exercise a distinctly counteracting influence on the development of phthisis.

"4. It is most effective in cases of recent date, though of utility in those of long standing. To insure benefit, at least six months, and, preferably, two years' stay, is desirable.

"5. It produces undoubted improvement in 75 per cent. of phthisis generally, and arrests the tuberculous process completely in 43 per cent."

He considers that its influence is best shown in consolidation, in which improvement may be looked for in 87 per cent. and arrest in 57 per cent.

In excavations great improvement occurs in 55 per cent. and arrest in 16 per cent., so far as his cases may be taken as a measure. The *general* improvement of which he speaks consists in improved digestion

and assimilation, gain of weight, and return of normal functions, and of color, and of muscular, respiratory, and circulatory power, at the same time that the evidences of disease cease to manifest themselves.

This list of *contraindications* will serve as a basis for decision, and probably applies with equal force to all high-altitude climates.

" 1. Phthisis with double cavities.

" 2. Fibroid phthisis and all other conditions in which the healthy pulmonary area hardly suffices for respiratory purposes at sea-level.

" 3. Catarrhal and laryngeal phthisis. (Holland would include cases with so-called 'gastrointestinal catarrh.')

" 4. Acute phthisis of all kinds, especially when associated with nervous irritability.

" 5. Phthisis with pyrexia.

" 6. Emphysema.

" 7. Chronic bronchitis and bronchiectasis.

" Organic disease of the heart and great vessels. (Holland considers *obstructive* disease to be an absolute contraindication; but, from his experience, if the pulmonary condition warrants the prescription of high altitude for its treatment, *regurgitant* lesion of the heart is no barrier.)

" 8. Diseases of the liver and kidneys, including all forms of albuminuria.

" 9. Disease of the brain and spinal cord.

" 10. Anæmia. (Holland, on the other hand, has found that anæmia cases, as a rule, do well, especially in summer; whereas the scrofulous do best in winter. This applies especially to children, who should arrive early in the season, before November, Solly's experience supports that of Holland as to the benefit of high altitudes in anæmia.)

" 11. Patients too feeble to take exercise.

" 12. Patients who have degenerated organs from long residence in tropical countries."

In considering the effects of altitude, Williams does not forget a most important adjunct to altitude, to which his patients were subjected, viz., the careful medical supervision, as practised in the Alpine stations where most of his cases were sent, and where supervision is both easier and more complete than in the Riviera and most of the southern resorts. His admission on this score corresponds with the repeated and unanimous advice of those familiar with our own high-altitude stations—that patients sent to such places should not be left to their own devices in using so potent a remedy, but should be referred to some competent physician, whose familiarity with the effects of altitude may help the patient to avoid deteriorating agencies and to obtain the best results possible by a careful supervision of his life and habits.

Dr. Solly, in a paper read before the American Public Health Association in Denver, 1895, deals with the hæmatogenetic results from altitude



in a thoroughly scientific manner. He quotes from a paper by Dr. Egger, before the Congress at Wiesbaden, 1893, to show the resulting increase in red corpuscles and in the total amount of hæmoglobin in the blood. In other words, the blood, as an oxygen-bearer, is decidedly magnified. Solly concludes, from these studies, which have been verified by studies by Koeppé and Wolf, that we have good reason to believe that there is developed in life at high altitudes a greater power of resistance to the attempted lodgement of germs within the body by means of the increased germicidal character of the more highly oxygenated blood and through the more perfect working of the heart and lungs.

It must be remembered that our resorts at high altitude furnish us not only with the especial stimuli to the respiratory and circulatory functions which attenuated air furnishes, but also less humidity, with its effects on sunshine, and increased power of the sun's rays as well as the roborant effect of cold.

Dr. Ruedi, personally familiar with both the Engadine and the Colorado climate, in a paper read before this Association in Philadelphia, in 1893, giving an elaborate comparison of the two localities, concludes that "in barometric variation, humidity, sunshine, and temperature, Colorado, New Mexico, and parts of Arizona have, in their mountains, natural advantages and climatic conditions which equal or surpass the best European health-resorts of this character."

Cases of phthisis suitable for transplanting climatically, but unsuited for altitude, may find relief in the warm and moist climates of sea-voyages. Irritative cases with bronchial or laryngeal catarrh are especially benefited, as also are cases in which a neurosis complicates the attack. Insular localities, like Jamaica or the Bermudas, may do for us what Madeira serves for the Europeans; and, with its mountain-range, Jamaica gives an opportunity for a more decided choice and variety than most islands furnish. Its benefits for the phthisical were well presented at the last Pan-American Congress, in the Section on Climate, by Dr. Wolford Nelson, of New York; Dr. James Henry Clark and Dr. James Cecil Phillipps, of Jamaica.

Southern California furnishes a warm climate with less humidity than a sea-voyage, and a varying humidity as the immediate seaboard or higher and drier points inland are chosen. The station is probably superior to the Riviera, with a somewhat similar climate.

It may be, however, that the continued experience of Trudeau, in the Adirondacks; Bowditch, at Chelsea; von Ruek, at Asheville, and others, will show that the sanatorium treatment of phthisis, with complete supervision and explicit personal care adapted to the particular case, gives as good results as the climatic, and that the future will not consign the incipient phthisical to a life of exile from home and friends. We await developments of what have already given promising results.

## REVIEWS.

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A SYSTEM OF MEDICINE BY MANY WRITERS. Edited by THOMAS CLIFFORD ALLBUTT, M.A, M.D., LL.D., F.R.C.P., F.L.S., F.S.A. Regius Professor of Physic in the University of Cambridge, etc. Volume I. New York and London: Macmillan & Co., 1896.

THE appearance of an extensive work on medicine by English authors is an event of more than ordinary interest. For years a notable activity has been shown in England in many lines of pathological research, but without being reflected in current works on general pathology or medicine to a noticeable extent. The present work represents specialization carried to an unusual degree. More than forty names appear in the list of authors, all but two of whom are British. In some instances two, four, or even five writers have been assigned to the preparation of various parts of single articles. That differences of view, sometimes diametrical, appear, is to be expected under the circumstances. We do not consider this a disadvantage, though it necessitates a comparison of different parts in order to acquire the correct idea.

The volume is introduced by the editor in a chapter of brief length, but great interest. If we become impatient of the unnecessary explanation regarding the word system—who now thinks of using it in the sense criticised?—we are more than repaid by the sound and sane remarks on method, disease, terminology, and other topics.

The first half of the book is devoted to the Prolegomena. Many of the articles here are useful for reference, and others may with profit be read for general information. Some are of great excellence. They are necessarily short, but most of them are quite free from the air of incompleteness so often apparent in articles of theoretic interest when prepared especially for practising physicians. The articles of Dr. Billings on Medical Statistics and Dr. Beddoes on Anthropology and Medicine may be cited as examples. The chapter on Inflammation by Dr. Adami, longer than the others, though kept within unusual limits, is one of the most luminous ever written on that subject. Comparative pathology furnishes the point of view, but the author has brought to his task a practical knowledge of the facts, a grasp of previous observations and views, a judicious use of material, and a power of exposition that combine to form a chapter every student of medicine should read. The article on the General Pathology of New Growths, by Mr. Shattock and Mr. Ballance, is an authoritative and succinct review of the present condition of that obscure subject. Lack of space forbids quotation from the purely pathological part of this article, but the remarks on treatment deserve to have special attention called to them. After mentioning various methods of treatment experimentally tested by the authors, they say: “Up to the present the only hope has lain in early

removal before the infective elements of the tumor have been widely transported into the surrounding tissues or to distant parts of the body. The most successful surgeon is he who, knowing the pathology of the disease, appreciates the value of free and careful excisions. The incisions must be planned to pass through parts believed to be healthy; no knife which has been infected with the juice of the tumor must be used for the division of healthy tissues, lest the seeds of recurrence be sown along the fresh-cut surfaces; and not only lymphatic glands must be removed, but lymphatic vessels. In certain localities the operation for cancer conducted on these principles may permanently rid the patient of the disease. Excision of cancer of the lip may be completely successful; so, in a certain percentage, is that of mammary carcinoma; whilst the free removal of the rectum is followed by better results as regards respite from recurrence than that of any other part."

Dr. J. K. Mitchell has an article on Massage which contains all that should be known on that subject, without falling into the error of so many writers who try to teach from books the art of massage rather than the knowledge of the art. The article on Nursing, by Miss Amy Hughes, also admirably fulfils its purpose as explained by the editor, that of showing the physician what may be expected of a nurse, and may also serve a more practical purpose. We cannot share the opinion of those who believe that physicians understand nursing by instinct. Dr. Leech's article on the Principles of Drug Therapeutics deals rather with a large number of details than with principles, for obvious reasons, and shows a cheerful optimism as regards the effects of many old and not a few new drugs.

Other noteworthy articles in this part of the book are those of Sir Dyce Duckworth on Dietetics and of Dr. Eustace Smith on Diet and Therapeutics of Children.

Division two is devoted to fevers, and is subdivided into two parts, a chapter on Insolation by Sir Joseph Fayrer composing the first of these. Nothing new is added here to the pathology of sunstroke, and the treatment of thermic fever advised, viz., by the use of quinine, antipyrin, phenacetin, antifebrin, and aconite, is not likely to be used in the United States so long as ice can be obtained, whatever may be its advantages in India.

The second part begins with a chapter on the General Pathology of Infection, in which Dr. Kanthack treats this difficult subject with great skill. This is followed by chapters on Local and General Diseases due to Pyococci and to some of the Infectious Fevers. Most of these articles are valuable. From their number, detailed consideration is impossible here. The reader will doubtless be especially interested in knowing how certain important topics are handled. The article on Diphtheria is one of the longest and is the work of four men, Mr. R. Thorne Thorne, Dr. Samuel Gee, Dr. Kanthack, and Dr. W. P. Herringham. With regard to the uncertainty caused by the discovery of diphtheria-bacilli without membrane, Dr. Gee is willing to wait for further knowledge. Dr. Kanthack "must refuse to call any lesion diphtheria unless it is associated with the bacillus; conversely, any morbid process accompanied by this organism is diphtheria." As regards the treatment of pharyngeal diphtheria, 20 to 30 per cent. solution of carbolic acid in sulphuric acid is recommended as the most efficient and least painful application. It is admitted that these applications are exhausting to the patient, and

a spray of boric-acid solution is recommended instead. Alcohol and strychnine are recommended for weak heart. The details for the treatment other than by serum are good as far as they go, but hardly explicit enough for a young practitioner. In laryngeal diphtheria Dr. Gee opposes the use of emetics on rational grounds. Tracheotomy is advocated when dyspnoea becomes considerable. "Intubation is a topic which hardly needs to be discussed with reference to diphtheritic laryngitis. In this disease tubage is not a reasonable method of treatment, unless, in a given case, we know that the exudation is confined to the larynx and will not spread beyond it. But these are certainties to which we cannot attain, and in practice we have nothing more to guide us than probabilities, which may be high or may be low. If we can believe the croup is not membranous, or that, if membranous, the disease does not extend below the larynx, we may be disposed to try intubation, but always with the prospect of having to perform tracheotomy afterward. Difficulties and dangers attend tracheotomy, and tubage is not free from them. What are called statistics are of little value in determining the relative merits of the two operations, and are of no value at all, if among successful intubations are to be reckoned cases in which the tube passed out per anum." The last sentence is obscure, but we have quoted the whole paragraph to indicate the view of the author (Dr. Gee). To those who find intubation a valuable means of treatment in many cases this judgment will seem one-sided. The directions for the serum-treatment are clear.

The article on Enteric Fever is by Dr. Dreschfeld. It is full, clear, and well arranged, and, being by one writer only, is free from repetition and contradiction. In describing the history of enteric fever the author does not allude to the important part taken by Louis and the American physicians in establishing the specific nature of the disease. Of course, this did not make less valuable or less difficult the task of Sir William Jenner, in England. As regards the etiology of typhoid fever the author holds that the bacillus of Eberth is the sole cause. The possibility that some cases classed clinically and anatomically as typhoid may be due to other microbes is not mentioned. Various methods of treatment are described, and their advantages and disadvantages compared. Antipyretic drugs are not condemned as strongly as they should be, and the doses of the various antipyretics are all, in our opinion, too large for any purpose. Of the antiseptic treatment, so-called, the author says he is inclined by experience to think well, though he adds that it is inferior to the cold-water treatment. Altogether the article is a valuable one.

Cholera has been described by five specialists, with the result of producing a valuable article, though, as might be supposed, containing contradictions. Thus Mr. Ernest Hart and Dr. Solomon Charles Smith hold that cholera is due to Koch's cholera-bacillus, but Dr. Kanthack does not think we have yet reached a conclusion on the matter. His description of the development of our knowledge of the bacteriology of cholera is very good.

The other articles in this part are: Septicæmia and Pyæmia, and Erysipelas, by Mr. Watson Cheyne; Infective Endocarditis, by Dr. Dreschfeld; Puerperal Septic Disease, by Dr. Playfair; Furuncle and Carbuncles, by Mr. Melsome; Epidemic Pneumonia, by Dr. Whitelegge; Epidemic Cerebrospinal Meningitis, by Dr. Ormerod; Influenza, by Dr. Goodhart; Tetanus, by Dr. George M. Humphrey and Dr. Sims

Woodhead; Plagne, by Dr. J. F. Payne; Relapsing Fever, by Dr. Rabagliata and Dr. Westbrook. These are all good, and some are valuable additions to medical literature. The volume, as a whole, deserves high praise, and the three volumes promised to complete the *System* will be awaited with great interest. The paper and presswork are good; the few illustrations answer their purpose. There is an index of authorities, as well as a general index. The proper names have suffered somewhat at the hands of the printer. G. D.

MINOR SURGERY AND BANDAGING. By HENRY R. WHARTON, M.D.  
Third edition. Philadelphia and New York: Lea Brothers & Co., 1896.

THE appreciation which is felt for this work by students and the profession is evident from the publication of three editions in less than five years. The present issue is larger than the previous ones and retains the same general characteristics. The reader is particularly struck with the excellent illustrations given in the section on Bandaging, which are evidently taken from photographs of patients upon whom the bandages have been applied. The sections on Excision of Joints and Operations upon the Nerves and Tendons have been made more comprehensive than in previous editions. Taken as a whole, the book is exceedingly satisfactory and contains much information which will be found useful to those teaching or studying operative surgery. It is not intended to be a complete discussion of all the possible operations on the human body, but is written from the standpoint of a practical teacher of operative surgery who desires to furnish his classes with a text-book which will meet the requirements of their collegiate course.

A good deal of attention is paid in Part II. to the preparation of materials for aseptic and antiseptic surgery. A reviewer naturally reads this portion of the work with special attention, because of its great importance. It is satisfactory, though perhaps in some particulars not so lucid as is desirable for those beginning the study of modern surgery. The recommendation that catgut ligatures and sutures be washed with castile soap and water before being placed in ether is of doubtful value. It would probably make the catgut soft and almost useless. In some places the directions scarcely seem to be explicit enough, as, for example, on page 153; it would seem from the description there given that in performing operations in an aseptic manner sterilized water alone is used for preparing the operative area and the surgeon's hands. While it is possible that this method may be employed by a few operators, it would not be trusted by many. The use of soap and antiseptic solutions to prepare the skin of the patient and the hands of the surgeon is by most surgeons considered an important preparatory step, even if sterilized water is to be subsequently used. It is possible that the author does not intend to say what he seems to say in this paragraph. A rather unfortunate typographical error is seen on page 121, where the bacillus pyocyaneus is called the bacillus pyogenes.

In discussing the ambulant treatment of fractures of the lower extremity the author states that the patient is allowed to walk about, bearing his weight upon the injured limb. The essential point in

applying this dressing is so to construct it that the patient does *not* bear his weight upon the injured limb, but upon the splint, which must be made strong enough and constructed in such a manner as to allow the injured limb to hang within it. The plaster-of-Paris splint is practically an artificial limb. This error in statement is to be regretted. It is possible that these defects may be due to haste in preparing the manuscript.

The author's fondness for long sentences also perhaps tends to obscurity. Sentences containing from thirteen to twenty-five lines are apt to become involved and to confuse the reader. Pages 122, 123, 347 show instances of this peculiarity of literary style.

J. B. R.

PRACTICAL MIDWIFERY: A HANDBOOK OF TREATMENT. By EDWARD REYNOLDS, M.D., Fellow of the American Gynæcological Society, of the Obstetric Society of Boston, etc.; Assistant in Obstetrics in Harvard University; Physician to Outpatients of the Boston Lying-in Hospital, etc. Third revised edition. Pp. 427. New York: Wm. Wood & Co., 1896.

WE gladly welcome the third edition of this most excellent book. Its first appearance five years ago brought within convenient compass the modern treatment of obstetrics in a better manner than had previously been done. In its second edition the author included symphysiotomy and revised the treatment of extra-uterine pregnancy in accordance with the abandoning of electrical treatment, which has become wellnigh unanimous. In the third edition he has recast the chapters on Asepsis and the Treatment of Septicæmia, and described the use of gauze-packing for hemorrhage and the surgical methods of inducing abortion and premature labor.

While it is true that "good wine needs no bush," still good material should be put in worthy dress. It is much to be regretted that so good a book in each of its editions has been so badly printed and so wretchedly illustrated. The cheapest woodcuts have been employed in illustrating this volume, although the resources in the art of the modern book-maker could have given the author worthy reproductions of his excellent original illustrations. The book should have been reprinted with appropriate and worthy type and illustrations. The author has covered the field of modern obstetric practice in a most satisfactory way, and his book is among the best of the modern handbooks upon the subject.

E. P. D.

TWENTIETH CENTURY PRACTICE: AN INTERNATIONAL ENCYCLOPÆDIA OF MODERN MEDICAL SCIENCE BY LEADING AUTHORITIES OF EUROPE AND AMERICA. Edited by THOMAS L. STEDMAN, M.D. Volume VI. New York: Wm. Wood & Co., 1896.

THE first article in this volume, by Professor James, of London, is on Diseases of the Nose. Evidently prepared for the general practitioner, it is to that extent accurate and reliable, and, like the following chapter on Diseases of the Accessory Sinuses of the Nose, by Jonathan Wright, of Brooklyn, may be consulted with profit.

E. J. Moure, of Bordeaux, has written the chapters on Diseases of the Nasopharynx and Pharynx and Diseases of the Tonsils. Why these should be separated by the article on Diseases of the Ear is hard to understand. Dr. Moure's articles are readable and give a clear exposition of his own views, but these are not, in our opinion, quite up to the usual standpoint in America. Tonsillitis is not described so well as we are accustomed to find it in the works of American authors. The description of Herpetic Tonsillitis, which the author regards "as one of the manifestations of herpetic fever," seems somewhat antiquated. Diphtheria is considered under the title of Diphtheritic Angina. This is merely an epitome, it being no doubt the intention of the editor to have diphtheria described more exhaustively in a later volume. The present short article is not so happily conceived as we should like. Diagnosis is dismissed in a few lines. The author says that "to dwell at length upon the points of diagnosis would be a pure waste of time, since the bacterioscopic examination alone can give a certain result. Furthermore, what we seek to know today is simply whether there is or is not present the bacillus of diphtheria, and whether the disease [*sic*] is a proper one for the employment of serumtherapy." This is not quite true. The important fact that there is a patient to treat behind the "disease" should be intimated here as well as in the section on Treatment, and some fuller advice should be given than is given here in regard to the treatment of doubtful cases until the bacterioscopic examination has been made, if it can be made at all.

In the section on Diseases of the Ear Dr. Albert H. Buck has made the most of his space, but the article is far too short to give the amount of theoretical knowledge of the subject that every physician should have. In a work so extensive as this it would seem as if more space could have been used for that purpose.

Diseases of the Larynx fare better at the hands of Francke H. Bosworth, as do those of the Trachea and Bronchial Tubes, by Sir T. Grainer Stewart and George Alexander Gibson. Both these sections are treated from a practical point of view, but with considerable detail, and the article on the Trachea and Bronchial Tubes is furnished with references to authors cited.

Winslow Anderson, of San Francisco, has been assigned the section on Diseases of the Lungs, excluding Croupous Pneumonia and Tuberculosis. In one respect this section reaches an unusual completeness, viz., in the chapter headed Diseases of the Bronchial Arteries. The description of the symptoms of inflammation of the pulmonary arteries is quite vivid and the remarks on treatment full, though contradictory. The use of diaphoretics to "open the pores of the skin" (p. 624) is well known to the laity. On the other hand, more important diseases, like infarct of the lung and chronic pneumonia, receive very inadequate consideration.

This volume, on the whole, does not reach the plane attained by the fourth of the series, which immediately preceded it. The lack of system which permits Diseases of the Ear to be classed among Diseases of the Respiratory Organs, and the lack of fulness in certain articles, are again prominent as they were in the first two volumes. This volume appeared out of order, but nevertheless at the time Volume V. was due. The editors and publishers are to be congratulated on the prompt appearance of the volumes; but if this is done at the expense of careful editorial supervision, the gain is a doubtful one.

G. D.

# PROGRESS OF MEDICAL SCIENCE.

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## THERAPEUTICS.

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UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.D., LL.D.,

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**The Value and Method of Using Digitoxin in Cardiac Diseases.**—DR. KARL HOFMANN notes two objections to the employment of this substance, the one its insolubility in water, and the other its causing vigorous local irritation. It has been used in three instances by the mouth, in thirty-seven by subcutaneous injection, and in nineteen by enemata. By the first method tablets of  $\frac{1}{250}$  of a grain were given. By the second 1 part of the drug was dissolved in 1500 parts of distilled water and 500 parts of absolute alcohol. The usual dose ranged from  $\frac{1}{128}$  to  $\frac{1}{64}$  of a grain, the maximum single dose being about  $\frac{1}{48}$  of a grain. The daily dosage should not exceed  $\frac{1}{32}$  of a grain. The remedy should be used freely for from two to four days; the total amount in exceptional cases has been  $\frac{1}{8}$  of a grain. The injections are followed by local burning pain lasting for from one-half to three or four hours, and redness for two or three days which is sensitive to pressure. Only once in about two hundred injections did an abscess supervene. By the last method a solution in 500 parts of absolute alcohol with 9500 parts of water was employed. The dose is as before, and the duration of treatment from three to five days; the maximum amount used was  $\frac{1}{8}$  of a grain. Inappetence, nausea, vomiting, and pain in the epigastrium occurred in nearly the same proportion (one-fourth), whether subcutaneous injections or enemata were administered. It is, however, noticeable that these symptoms were pronounced in the earlier part of the investigation, when larger doses were continued over longer periods of time. Six hours after the first dose in many instances the pulse became stronger and the dyspnoea was lessened. Within twelve hours in nearly all cases diuresis was marked. If enemata were employed, these changes occurred in from twenty-four to thirty-six hours. In spite of the objections to subcutaneous injections the speedier results are favorable to its use, or, as was done in severe cases, one or two injections may be given and the treatment then carried on by enemata. The indications for the use of the drug are those pathological conditions in



which there are arterial ischæmia and venous hyperæmia—an abnormal division of blood between the systemic and pulmonary circulation. Upon forty-four patients the results were unmistakable. Of these, twenty-three showed moderately good results: diminution of the dyspnœa, strengthening of the pulse, and lessened frequency, moderate diuresis, and improvement in the general condition. In twenty-one instances, principally of mitral incompetency, the broadening of the pulse with increase of tension, which speedily appeared within from six to twelve hours, and reached its highest point upon the fourth or fifth day, was well marked. The diminution in pulse-rate, which in a few instances reached to forty, appeared after two or three days, and remained low, in spite of the discontinuance of the drug, from seven to ten days, thus indicating its slow elimination. A peculiar effect upon the pulse was noticed—that a previously existing dicrotism became less or disappeared altogether. So far as concerns arrhythmia and irregularity of the pulse it was repeatedly noted that with the improvement of the other pulse-qualities these also were bettered. There was also a constant improvement in dyspnœa and sensations of oppression. The diuretic effect, as stated by other authors, is confirmed in this paper. In about one-third of the cases diuresis was prompt and copious. The most important contraindication to the use of the drug (besides severe muscular degeneration) is existing well-marked gastro-intestinal disturbance. In children, however, this remedy must be used only with the greatest care.—*Wiener klinische Wochenschrift*, 1896, No. 42, S. 939.

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**The Therapeutic Uses of Tannoform.**—DRS. D. DE BUCK and L. DE MOON note the inconveniences of tannin, notably its property of dissolving in the stomach, where it irritates the mucous membrane and precipitates albumin, mucin, and gelatin, which prevent its use as an intestinal astringent. Tannoform is prepared by dissolving tannin in warm water to which a solution of formic aldehyd is added. Some time after the addition of concentrated hydrochloric acid a precipitate forms, which is washed with water and dried. The result is a light-yellowish powder without taste or odor, insoluble in water and in solvents of organic substances, alcohol excepted, but soluble in weak alkaline solutions, from which acids precipitate it. From this combination we get both an astringent and an antiseptic which is useful for the treatment of intestinal catarrh, both acute and chronic. Even in a 15-grain dose it does not irritate. It is useful also as a topical application for wounds and ulcers, in bromidrosis, bedsores, inflammations of mucous surfaces other than those of the digestive tract, as balanitis, vaginitis, ozæna. Twenty-one instances of its use are reported.—*Revue de Thérapeutique Médico-chirurgicale*, 1896, No. 19, p. 579.

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**Tannigen.**—DR. R. HIRSCHBERG states that this drug passes through the stomach without decomposition, but in the intestine is broken up into tannic and acetic acids; this decomposition takes place slowly, so that the entire length of the alimentary canal may be acted upon. The dose for an adult is  $7\frac{1}{2}$  grains, given in a cachet. If administered in water or milk, it forms glutinous masses which are difficult to swallow. It seems to have its most important use in the diarrhœas of various kinds, and is contraindicated in

inflammatory conditions of the intestine with marked transudation of serum, in simple dyspepsias and intestinal disturbances caused by them.—*Revue de Thérapeutique Médico-chirurgicale*, 1896, No. 20, p. 618.

**The Antiseptic Power of some Prepared Antiseptic Solutions.**—DR. G. C. CRANDALL, in order to ascertain the power of some of these solutions to check the growth of bacteria, made a series of experiments, using sterilized bouillon as a culture-medium, with anthrax, diphtheria, and streptococci. The solutions tested were borolyptol, pasteurin, euthymol, and listerin, in amount from  $\frac{1}{2}$  to 50 per cent. The results show a marked difference in the power of the preparations; the first two are active in relatively weak solutions, the last two must be used in very strong solutions. Their general composition, so far as can be ascertained from their formulas, is similar; but the first two contain formaldehyd, which doubtless enhances their antiseptic power. The second preparation contains also the oil of cinnamon, which is a very efficient antiseptic. These two substances appear to be well adapted for use as prepared antiseptics, as the solutions containing them certainly far surpass in antiseptic power the two which do not contain them. The volatile and diffusible properties of formaldehyd render it more effective as a rapid antiseptic than the other elements which we find in these preparations.—*St. Louis Medical and Surgical Journal*, 1896, No. 671, p. 293.

**The Value of Amyloform in Surgery.**—DR. C. LONGARD states that this is a result of the chemical union of formaldehyd with starch, and appears as a white powder, without odor or poisonous properties, and when rubbed in the hand has a sandy feel. It is absolutely insoluble in solvents, and is of such stability that it is not decomposed by high temperatures. Gauze, when impregnated by it, can be treated with steam without changing the drug in chemical constitution or physical character. It may be stated that: 1. It is strongly antiseptic, deodorant, and absorbent. 2. It is not decomposed by high temperatures. 3. It is non-poisonous and non-irritant. 4. It is cheap. Various suggestions as to its use follow, and the general conclusion is that in no way is it inferior to iodoform.—*Therapeutische Monatshefte*, 1896, Heft 10, S. 557.

**The Uses of Formaldehyd.**—MR. F. C. J. BIRD states that the commercial article known by this name is a concentrated solution containing 40 per cent. of the drug. The effects produced by the various solutions are as follows: 1 to 125,000 kills anthrax-bacilli; 1 to 50,000 prevents the development of typhus-bacillus; 1 to 25,000 forms a useful injection in leucorrhœa; 1 to 2500 destroys the more resistant micro-organisms in one hour; 1 to 500 is useful for the irrigation of catheters and as a mouth-wash; 1 to 200 or 250 is a general disinfectant solution for washing hands and instruments, spraying in sick-rooms, and as a deodorant; 1 to 100 is used for lupus, psoriasis, and other diseases of the skin.—*American Journal of Pharmacy*, 1896, No. 11, p. 617.

**Hæmol.**—DR. JOHANNES BARTELT reports thirty instances of the use of this drug. He concludes: 1. That there is no doubt that this remedy is

capable of absorptiou, and in very debilitated individuals is useful for the building up anew of the red blood-corpuscles. 2. The relatively small content of iron frequently, even after three weeks' use, does not present any clinical results; therefore the favorable action of hæmol must be due to entire constitution of the remedy, which may be designated as a blood-corpuscle extract. 3. Its administration is very simple, for, with the exception of gastric ulcer, which it may irritate, there are no untoward symptoms arising from its use. It does not give rise to constipation, the appetite remains unchanged or improved, and the teeth do not become blackened nor carious. 4. There is especially to be commended for the use of neurologists and dermatologists a combination with as much arsenous acid as may be necessary, a hundred times as much of the drug, which should then be given in pill-form. In this way the unpleasant gastric symptoms, to which arsenic may give rise, are obviated. Doubtless the arsenous acid combines with the drug, forming an arseno-hæmol, analogous to the copper-, zinc-, or mercury-hæmol, and it is probable that there is a rapid absorption.—*Therapeutische Monatshefte*, 1896, Heft 10, S. 533.

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**The Effect of Alcohol upon the Growth of Children.**—M. LANCEREAUX details the important facts in a striking example, and goes on to say that in the alimentary hygiene of children milk should not be neglected, because it contains all that is necessary for their development—fatty substances, albumin, oxygen, and the principal minerals. With it we can be certain that the growth will be normal; that there will be no failure in height, no rhachitis, no bony lesion. The use of alcohol by children is one cause of depopulation. The conclusion reached is that it is as dangerous as is an excess of alcoholic beverages for an adult; for the adolescent they are deadly, because they cause organic changes, hinder physical development, and impair the normal faculties even to the extent of degeneracy. For these reasons, then, alcohol should be proscribed as drink for children.—*Journal des Praticiens*, 1896 (2e serie), No. 42, p. 665.

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**Serotherapy in Pulmonary Tuberculosis.**—DR. L. R. REGNIER reports his experience with the serum of Maragliano (see this JOURNAL, vol. cxii., No. 4, p. 469), which contains the specific antitoxins which neutralize the tuberculous poisons in man and animals, and whose bactericidal power can be easily demonstrated *in vitro*. Together with three preceding observations, he now presents nine. These are few in number, but possess some value because of the length of time during which they were under observation. After citing a recent report by Maragliano, of the results in three hundred and twenty-four [274] cases, of which fifty are stated to be stationary, one hundred and forty improved, forty-five showed good results, twenty-five none, and fourteen died. Those instances of tuberculosis associated with other microbes, and those of rapid progress show the least favorable results. It is evident that in the apyretic cases, even when cavities exist, the serum is endowed with a real therapeutic power, and that in proper doses it is not dangerous. So far as regards its efficacy we cannot go far wrong when we state that it is one of the most active agents which we have at our disposal for the contest against pulmonary tuberculosis.—*La Progrès Médical*, 1896, No. 41, p. 233.

# MEDICINE.

UNDER THE CHARGE OF

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**The Left Auricle in Mitral Stenosis.**—In a thesis of seventy-five pages SAMWAYS (*Paris*, 1896) attempts to prove that in pure mitral stenosis compensation is maintained (in the majority of cases) by hypertrophy of the auricle, associated with a prolongation of the auricular systole, which continues during a part or all of the time during which the ventricle is expelling its contents. To show that hypertrophy of the auricle predominates over dilatation, he offers in evidence quotations from Corvisart, Laennec, Stokes, Potain, and Rendu; also a study of the statistics of Guy's Hospital, and several surgical autopsies that revealed mitral stenosis accompanied by hypertrophy of the auricle without dilatation.

Good evidence of the fact that the auricle is able to bear the brunt of the valvular lesions Samways finds in the clinical fact that in cases of mitral stenosis with the "buttonhole" orifice, so long as the strength of the hypertrophied auricle is maintained there is only the presystolic and not the systolic murmur audible.

This phenomenon is explained on the basis of the physical law, "the pressure necessary to dilate a hollow sphere varies inversely with its radius," so that the weaker sphere when small may be able to maintain an equilibrium (under common pressure) against a sphere with more resistant walls, provided the latter be larger. Samways maintains that the same physical conditions exist in mitral stenosis accompanied by hypertrophy of the left auricle; *e. g.*, the auricle contracts at a time when the ventricle is dilated, and by prolonging the auricular systole it encroaches upon the systolic phase of the ventricle long enough to prevent regurgitation into the auricle.

This prolongation of the auricular systole in mitral stenosis Samways does not claim to prove, but considers it highly probable, in view of the work of Roy and Adami and Potain, who state that the auricular systole lasts during the preparatory or mitral phase of the ventricular systole in a normal heart. The added clinical fact that in well-compensated mitral stenosis the murmur precedes the valvular tone heard at the apex during the systole, and also that the first phase of the apex-excursion is accompanied by the presystolic murmur, makes it seem probable that the auricle maintains its contraction during a large portion of the time occupied by the systole of the ventricle. Furthermore, when dilatation of the auricle supervenes compensation is broken and a systolic as well as a presystolic murmur is heard. The systolic murmur heard at the heart's apex in mitral stenosis may, in some cases, be from the

tricuspid orifice, as the hypertrophied and dilated right heart may form the apex of the heart.

**The Etiology of Erythromelalgia.**—DEHIO (*Berliner klinische Wochenschrift*, 1896, No. 37) reports an interesting case of erythromelalgia, and endeavors to explain the various symptoms of the affection.

The patient, a washerwoman, aged thirty years, had suffered from repeated attacks for a period of five years. The palmar surface of the left hand, including that of the fingers, was of a deep-red color and extremely painful on pressure or motion. The skin over the same area presented minute nodules the size of millet-seeds, and was constantly bathed with perspiration. On the dorsum of the second and third phalanges the skin was thin, smooth, and very glossy. The muscles of the left hand were a trifle atrophied, and the muscular power somewhat diminished, both of which were attributed to disuse of the hand for so long a time. The sole of the left foot and ball of the great toe presented a condition similar to that found in the left hand. Severe pain was experienced in the left shoulder-joint whenever the arm was moved, although there was no evidence of a local joint-affection. The patient's face was of a cyanotic, leaden hue, and the subcutaneous tissue thickened and dense, somewhat suggesting myxœdema. Dizziness and intense headaches, associated with vomiting, were frequently experienced. An interesting feature in the case was the presence of distinct arteriosclerotic changes in the left radial and ulnar arteries, there being no evidence of similar changes in other parts of the vascular system.

The sensibility of the affected parts was slightly impaired, but an electrical examination of the muscles and nerves failed to give any evidence of the reaction of degeneration.

Therapeutic agents giving no permanent relief, portions of the left ulnar nerve and artery 4 cm. long were excised just above the wrist-joint. After the operation the skin of the little finger resumed its natural color and was quite dry, while the remainder of the hand retained its cyanotic, hyperæmic appearance and moist condition. Histological examination of the ulnar nerve showed it to be perfectly normal, whereas definite arteriosclerotic changes were present in the ulnar artery, the intima being much thickened and the lumen of the vessel markedly diminished.

The return of the normal color of the little finger after operation led Dehio to conclude that the hyperæmia of the affected part was due to some lesion that caused stimulation of the vasodilator nerve-fibres that pass along with the nerve-trunks. Had the erythema been due to a paralysis of the vaso-constrictor nerve-fibres no change in color could be expected to follow excision of a portion of the nerve.

The excessive sweating and the pain were attributed to irritation of the nerves controlling the sweat-secretion and irritation of the sensory nerves respectively. The formation of minute nodules and the atrophic changes in the skin are not clearly explained, but are considered to be due to trophic disturbances.

An ingenious explanation is given for the changes in the left radial and ulnar arteries. Thoma found that where the calibre of a vessel was too large for the volume of blood that passed through it, that a compensatory diminu-

tion in the size of the lumen of the vessel occurred, and that this was produced by a thickening of the intima. Dehio explains the thickening of the intima of the ulnar artery in this case in a similar manner.

Dehio, contrary to the views of many, considers that erythromelalgia is a special disease, with a special pathology of its own. He thinks that the hand-and-foot symptoms in his case were due to lesions in the cervical and lumbar portions of the spinal cord respectively, and regards the most likely seat to be in the posterior cornu of the gray matter. The intense headache, dizziness, vomiting, and facial symptoms, he thinks, were due to an intracranial lesion. He is of the opinion that erythromelalgia is central rather than peripheral in origin, and that the lesion may probably be glomatous in nature.

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**Carious Teeth and Tuberculous Cervical Glands.**—STARCK (*Revue de la Tuberculose*, July, 1896) notes the frequent association between carious teeth and enlargement of the cervical lymph-glands. He examined 113 children with enlargement of the cervical lymph-glands, and found that 1 per cent. had carious teeth. Not being able to find any other apparent cause for the condition, he concluded that the swollen glands resulted from the defective teeth in this series of cases. They corresponded in situation, in time of development, and in the degree of enlargement with the condition of the teeth. The involved glands were situated on the same side as the diseased teeth, the anterior glands being enlarged if the incisors were carious, and those at the angle of the jaw when the molars were involved. Toothache frequently preceded the enlargement of the glands. Starck is of the opinion that the enlarged glands are tuberculous in quite a number of these cases. He reports two cases in which he was able to demonstrate pretty conclusively that the carious teeth had been the point of entrance of the tubercle-bacilli. One, a boy, aged eighteen years, who had always been healthy and without a family history of tuberculosis, had caries of the molar teeth on both sides, with enlargement of the cervical glands. The glands were excised and the teeth extracted. The former proved to be tuberculous on examination, and tubercle-bacilli were found in cover-slip preparations from two of the decayed teeth. The second was a girl, aged fourteen years, with excellent personal history and without a history of tuberculosis in the family. The first inferior molar tooth on the left side was carious, and there was an enlarged gland below the ramus of the jaw. The gland was removed and showed definite tuberculous disease. Between the diseased molar and the adjacent tooth and also forming the floor of the cavity in the tooth were characteristic tuberculous nodules with typical giant-cells. This latter case is specially interesting, as it seems to show that a carious tooth may be the seat of a primary tuberculous focus. With regard to treatment, the glands should be at once removed and the carious teeth should be either properly filled or extracted. As a prophylactic, the teeth should be better cared for, and Starck advocates with Rose the placing of school-children under the supervision of a competent dentist.

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**Diabetic Neuritis, with Interesting Changes in the Muscles.**—FRASER (*Edinburgh Medical Journal*, October, 1896) reports a fatal case of diabetic

neuritis. There was nothing special to note in the clinical history of the case. The ordinary symptoms of neuritis were present in both lower extremities. At autopsy portions of both optic and posterior tibial nerves, as well as portions of the tibialis posticus muscle, were removed for examination. The optic nerve, on microscopic examination, showed well-marked parenchymatous degeneration in various stages. In the posterior tibial nerves the degenerative change was almost entirely limited to the medullary sheath of the nerve-fibres, the axis-cylinder remaining intact throughout, although it here and there presented slight varicosities. The change in the nerve-fibres resembled a degenerative change first described by Gombault in the nerves of guinea-pigs, to which small quantities of white-lead had been administered along with their food. Gombault gave the degenerative change the name of "neurite segmentaire periaxile."

The microscopic examination of the tibialis posticus muscle showed an interesting change. Sections stained with eosin and hæmatoxylin showed a slight increase in the distinctness of the longitudinal striation of the muscle-fibres. This increase was explained by treating the sections with osmic acid, when it was found to be due to rows of minute fat-granules situated between the fibrillæ of the muscle. The granules were all extremely small and appeared to be developed from the cement-substance between the fibrils rather than from the fibrils themselves. The degeneration did not affect the whole of any one muscle-fibre, but only short lengths of the fibres, and gave the section an appearance somewhat similar to that seen in fatty degeneration of the heart. In the portions of the muscle where this degenerative change was found the transverse striation of the fibres had disappeared. There was no multiplication of the nuclei of the sarcolemma or of the connective tissue. The process is different from that which results from a descending degeneration of a nerve, and the change appears to be due to an independent and direct action on the muscle itself of some toxic substance, rather than to any want of trophic influence on the part of the nerve.

Fraser has been unable to find any similar condition described in the literature, and has suggested the name "disseminated interfibrillary fatty degeneration of the muscle" to the change.

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**Lymphangiectasis of the Tongue.**—An interesting case of lymphangiectasis of the tongue is reported by WILKINSON (*Quarterly Medical Journal*, October, 1896). The patient was a little girl, nine years of age. There was nothing of importance in the family history. The child had always been pretty healthy, with the exception of slight attacks of inflammation of the tongue. The mother thought that the child's tongue had always been rather large, although her attention was specially drawn to the fact when the patient was four years of age. After each attack of inflammation the tongue was somewhat larger than before. An examination of the organ between the inflammatory attacks showed it definitely, although not greatly, enlarged, and marked at the right side by impressions of the teeth and alveolar processes. There was a deep central groove on the dorsum, with a minor groove on either side running parallel. The whole of the surface of the tongue, particularly on the under surface just below the tip and lateral margins, was covered with small, transparent vesicles, looking like sudamina on the skin.

In the left half of the tongue, about midway between the tip and base, was an induration about the size of an almond. The vesicles in front of the lump were more numerous on the left than on the right side. The majority of the vesicles contained a clear lymph and collapsed after being opened. A few contained some blood.

Wilkinson regards the condition as being due to a dilatation of the lymphatics, and that it was probably a case of macroglossia in an early stage. The acute inflammatory attacks were likely due to the tongue getting between the teeth and being bitten. The inflammatory exudation would cause a further obstruction of the lymphatics and thus explain the increase in size after each acute attack.

In 1854 Virchow was the first to show that the so-called hypertrophy of the tongue, or macroglossia, consisted of a dilatation of the lymphatics. This lymphatic dilatation is considered in most cases to be due to a congenital lack of development of the lymphatics.

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## SURGERY.

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On the Operative Treatment of Hypertrophy of the Prostate, particularly by Ligation of the Vasa Deferentia.—Including two observations of his own, G. STEINHEIL (*Thèse de Paris*, 1896) has collected fifty-seven cases of prostatic hypertrophy, in which ligation of the vasa deferentia was performed. The author believes that the clinical results of ligation and of resection of the vasa deferentia in prostatic hypertrophy are similar to those of castration.

Resection, he says, is to be preferred to simple ligation, or the subcutaneous division. The operation has given good results, especially in the cases of congested, soft, elastic swellings of the prostate.

He thinks the operation is contraindicated in the irregular, hard, fibrous forms of prostatic enlargement, and when the ability of the bladder to contract is lost completely. In these cases suprapubic cystotomy, perineal prostatotomy, as recommended by Harrison, and suprapubic prostatectomy have the preference.

In very feeble, old people, and in those with severe organic or mental disturbances, any operative measure is usually contraindicated.

While the author admits that castration and the permanent catheter are the



basis of the modern treatment of prostatic hypertrophy, he prefers resection of the vasa deferentia to the former, and thinks, if this fails, resort to castration would be futile. This is, however, not borne out by the experience of other writers.

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**Rupture of the Pancreas.**—HADRA reports the following case in the *Medical Record*, 1896, vol. i., No. 3: a boy, aged nine years, was struck in the epigastrium with the handle of a bicycle. He fainted, vomited, and in a short time appeared to have fully rallied. Five hours after the accident he began to have severe abdominal pain. Expectant treatment was adopted, as no lesion could be detected, and slow improvement followed. The patient's appetite was excessive and perverted. Twenty-four days after the injury a swelling in the region of the stomach was first noted. Three days later a fluctuating tumor could be detected behind the stomach. The latter was plainly visible through the abdominal wall, as was also the transverse colon. The temperature varied between 98.9° and 99.2°.

A diagnosis of rupture of the pancreas was made and the patient operated upon. On opening the space between the stomach and the transverse colon a clear, limpid fluid escaped. The fluid was found to be alkaline, and readily changed starch into sugar. Drainage was provided for, and the wound closed. Recovery followed.

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**A New Method of Defining the Fissure of Rolando.**—MORISON describes (*British Medical Journal*, 1896, No. 1868) the following method for locating the fissure of Rolando:

"The measurements may be made with a piece of sterilized silk marked off by knots to form the triangle, or by defining the sides of the triangle by means of the surgeon's finger, whose length is already known. A point is taken half-way between the glabella and the external occipital protuberance, and the breadth of the little finger behind it (about half an inch) indicates the apex of the triangle. An isosceles triangle is then mapped out on the scalp; its sides are three and three-quarters inches long. One lies in the middle line forward from the point mentioned above. The base measures four and one-eighth inches, and is anterior. The posterior side of the triangle is over the fissure of Rolando. Trigonometrically the apical angle of this triangle is  $67^{\circ} 27' 52''$ , and this is practically identical with the angle formed by the fissure and the middle line of the skull worked out by other methods, and, from an examination of a large number of skulls of various sizes, is constant and correct."

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**The Treatment of Paralytic Clubfoot by an Osteoplasty in Combination with Arthotomy.**—ISNARDI (*Cent. für Chirurgie*, March, 1896) reports two interesting cases in which he produced excellent results by the implantation of a fragment of denuded bone between the astragalus and tibia, thus producing a bony ankylosis.

He was led to this procedure by finding, on repeating an operation that had been unsuccessful, that there was a wedge-shaped space between the astragalus and tibia which had been filled only by connective tissue, and

consequently did not resist the counter-pressure after the joint was released from the bandage.

Reasoning that the result was similar to that of ununited fractures, where the bones are not in close apposition, he determined to induce bony ankylosis by filling in the space with freshly denuded bone. This was done, using a fragment of child's bone which had just been resected. The fragment was held in place by an iron-wire suture which ulcerated out later, with a small sequestrum. The author made the observation at that time that the new bone was penetrated by many arterial capillaries, showing that it acted as the skeleton over which the new bone grew, and was not of itself permanent.

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**Murphy's Anastomosis-buttons.**—GRAFF (*Arch. für klin. Chir.*, 1896, Band 52, Heft 2), after a careful discussion of the application and method of employing these instruments in the production of anastomosis, comes to the following conclusions :

1. The Murphy button entirely replaces the intestinal suture. Its great value is the ease and rapidity with which it may be employed.
2. With proper technique, and employment of a well-constructed button, its use is absolutely harmless.
3. Outside conditions may complicate the course of recovery, but are less seldom seen, apparently, than one would suppose theoretically.
4. In every case it is recommended, for certainty, to employ a serous suture over the button.

The author recommends the use of the buttons in every case in which the result of the operation is dependent upon the rapid establishment of an anastomosis, and hopes that the cases reported will lead other surgeons to employ them.

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**Ischæmic Contracture of the Flexor Muscles of the Forearm Corrected by Excision of a Portion of both Bones.**—HENLE (*Cent. für. Chir.*, May 9, 1896) reports a case in which it was impossible to correct the deformity produced by the contraction of the flexor muscles of the forearm either by an operation embracing all the tendons or by forced extension under anæsthesia, as in the former case the operation would have involved too great an area, and in the latter there would be no hope of permanent relief.

The ischæmic etiology of the deformity made the muscles useless, and their contractibility was destroyed by the formation of connective tissue within the muscles themselves.

There were only two methods of correcting the deformity: one was to lengthen the muscles, the other to shorten the bones; the former was impossible, so the author determined upon the latter.

The resection of both bones restored the usefulness of the arm and corrected the deformity.

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**Cholecysto-duodenostomy and Cholecysto-gastrostomy.**—TERNIER (*Rev. de Chir.*, March, 1896) reports two cases that are of great clinical and physiological interest, illustrating how difficult diagnosis is in these cases, and proving that the loss of life by an external fistula does not materially affect nutrition, at least for a considerable length of time, and, in addition, that the

introduction of bile into the stomach either by a duodenal or gastric fistula does not hinder the action of the gastric juice, as has been already demonstrated in animals.

In the first case there were present chronic icterus and biliary lithiasis. Cholecystotomy was performed; a biliary fistula resulted, as the duct was found to be occluded; the patient, however, continued to gain flesh, and was healthy despite the loss of bile. The inconvenience and irritation of the bile externally induced a second operation; cholecysto-duodenostomy was performed, and the patient recovered and continued to improve until an intercurrent cancer of the duodenum obliterated the ampulla of Vater, and the symptoms returned again.

In the second case the patient presented marked icteric symptoms which became so aggravated and the gall-bladder so dilated that operation was decided upon. No calculi were present, but a neoplasm of the head of the pancreas with an involvement of the liver. A cholecystenterostomy was decided upon, but it was found impossible to bring the duodenum and gall-bladder together, so the author determined to perform a cholecysto-gastrotomy; this was done, and the patient made a good recovery. The presence of the bile apparently had no influence upon the digestion of the stomach, as the patient gained in weight, and there were no symptoms of indigestion that could be called gastric.

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**Tendon-transplanting in the Treatment of Paralytic Deformities.**—GOLDTHWAIT (*Boston Med. and Surg. Journ.*, January 6, 1896) calls attention to this method as a possibility of furnishing better mechanical attachment for certain paralyzed or partially paralyzed muscles, as a part of the treatment of paralytic deformities.

The cases selected for operation are those in which one group of muscles has been destroyed, leaving the antagonizing or accessory muscles little if any impaired. This condition, if not treated, results in a definite deformity, simply from muscular activity; and this becomes more marked as the age of the patient increases, partly because of the greater weight to be borne and partly because of the greater strength of the non-paralyzed muscles.

The author then details a number of cases with the *rationale* of the operation in each case. He deduces the following conclusions from his work on this subject:

The best results are to be looked for in the cases in which one group of muscles is paralyzed, leaving the antagonizing or accessory group unimpaired. Much of the deformity is due to the action of these muscles, without the control of the other group.

Four cases are reported after at least three months since the operation. The first case, that of an adult, was operated on over a year ago. In all there has been a marked improvement. In three cases the peroneus longus was attached to the tendo-Achillis, and the peroneus brevis to the flexor longus pollicis. In two cases the anterior tibial tendon was attached to the peroneus tertius.

The tendons were attached by splitting one and drawing the other through this, and suturing them with quilted sutures.

## DERMATOLOGY.

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 UNDER THE CHARGE OF

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An Oidium in the Skin of a Case of Pseudo-lupus Vulgaris.—J. C. GILCHRIST and W. R. STOKES (*Bulletin of the Johns Hopkins Hospital*, July, 1896) report the results of microscopic investigation in a case of disease of the skin which resembled lupus vulgaris more than other diseases. Miliary abscesses were found in the epidermis and in the upper portion of the corium, in all of which were numbers of doubly contoured, refractive, round and ovoid bodies, many of them with buds, others with vacuoles. They were arranged singly or in groups, contained granular protoplasm, and resembled closely blastomycetes. No tubercle-bacilli could be found in any of the sections. The writers were of opinion that this extensive cutaneous disease was caused by the species of oidium described, and that this is the only example in literature of a pure disease of the skin which has been shown to be caused by a species of oidium, and the third example in which lesions of the human skin have been produced by organisms allied to the yeast-fungi, Busse's case and Gilchrist's case being the other two.

[The case is of great interest, especially in connection with Wernicke's Busse's, and Gilchrist's investigations in other similar cases, recently reported.]

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A New Lotion for Certain Itching-diseases.—C. BÖECK (*Monatshefte für prak. Derm.*, Bd. 21, No. 3) gives the following formula, of value in dry, itching, inflammatory diseases of the skin: talc and powdered starch, of each 50 grammes; glycerin, 20; lead-water, 100. This is to be diluted with twice the volume of water, shaken, and applied to the skin with a brush or mop and permitted to dry on. The effect of the lotion, which of course contains the talc in suspension, is cooling, anti-pruriginous, astringent, and antiseptic. Half of the lead-water may be replaced by a 1 per cent. boric-acid solution, especially where the skin is tender. The lotion is useful in acute and chronic dry eczema, papular eczema, and in inflammatory psoriasis, but is contraindicated in diseases in which there is fluid discharge.

[We have tried this lotion in papular and in erythematous eczema, and have found it useful.]

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Local Use of Potassium Permanganate in Diseases of the Skin.—L. D. BULKLEY (*Medical Record*, February 29, 1896) finds this drug, in 1 to 2 per cent. strength, useful in a considerable number of cases of eczema, and also

in some other diseases accompanied with itching. The solution is brushed or mopped over the surface and permitted to dry in, which it does quickly. The brilliant pink or magenta-colored fluid turns very soon to a moderately dark-brown, staining the skin for some little time and is finally cast off by exfoliation of the tissues which it has oxidized. It is of most value in subacute erythematous, papulo-squamous, and moist or weeping eczema. Immediate relief from itching is usually experienced. It may be applied two or three times daily. It often serves to reduce thickened skin, and in some cases its use may be followed by zinc oxide lotion or an indifferent ointment.

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**Streaked Skin Affections of the Lower Extremity.**—JULIUS HELLER (*International Atlas of Rare Skin Diseases*, Part xii., 1895) depicts collectively several old and recent cases of this particular group of diseases of the skin. The striated distribution of the disease over a part or the whole of the lower extremity is dependent upon anatomical conditions, and is common to the whole class of such affections. The cases depicted and described were observed by the writer, by Unna, Shearer, Philippson-Unna, and Neumann. Some were of an inflammatory nature, others possessed the general characters of naevi, for the most part unilateral. He concludes that although the illustrations of the five cases, the history of the diseases, and his observations upon the cases do not solve the pathogenesis of these striated diseases of the skin, nevertheless they lead to the following positive and not unimportant conclusions. All attempts to explain by any one system the streaked or striated affections of the lower extremity have failed. Just as in the one case involvement of the larger lymphatics can without doubt be considered the cause of the streaked character of the eruption, so in other cases this factor can be with certainty excluded. The anatomical basis of every case ought therefore to be separately determined.

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**Pitting about the Hair-cups.**—In a paper read at the meeting of the American Neurological Association, June, 1896 (*Journal of Nervous and Mental Disease*, September, 1896) BROWNING calls attention to a trophic change of the skin in certain nervous disorders of central origin. This change consists in a faint depression, frequently oval, in the direction of the lines of the skin, about the exit of each hair. The depression is slightly paler than the surrounding skin, almost like a minute cicatrix, but soft to the touch. The change is usually found upon the extremities, being most marked upon the lower ones. On the upper extremities it is seen best on the outer side of the forearms. On the lower extremities they are chiefly noticeable on the front and outer side of the leg a little below the knee. In chronic anterior myelitis associated with progressive muscular atrophy the author has never found this pitting absent. Other diseases in which it has been noted are paralysis due to lead-poisoning, spastic tabes of syphilitic origin, grave hysteria. Apparently this pitting is to be regarded as indicative of disease of the spinal cord, especially of the anterior horns, and is useful in differentiating central from peripheral disease. Prognostically the pitting indicates a grave disorder.

## OBSTETRICS.

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 UNDER THE CHARGE OF

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**The Early Recognition and Treatment of Puerperal Fever.**—In the *British Medical Journal*, October 24, 1896, BYERS contributes an article upon this subject. He very wisely calls attention to the fact that every pregnant woman should be examined to determine the presence or absence of disease of the blood or deficiency in the processes of elimination. He believes that where antiseptic precautions are taken the pulse and temperature vary but little from the normal. The first symptoms of septic infection he considers rapid pulse and fever. The interesting question arises as to whether any cause but infection can produce marked change in pulse and temperature after confinement. He has occasionally seen such cases. Among others he describes tonsillitis, appendicitis, influenza, phthisis, rheumatism, old pelvic abscesses, and suppurating ovarian tumor as causing rapid pulse and high temperature after labor, while puerperal septic infection was absent. The earlier after labor the symptoms appear, the worse the prognosis. He distinguishes sapræmia and septicæmia.

In treatment he would thoroughly examine a patient so soon as symptoms appear. The uterus should be explored and any laceration in the genital tract disinfected. He has seen good results from prolonged intra-uterine irrigation. This should be continued twelve hours in some cases, a dilute antiseptic being employed. If the finger can detect sloughing membrane in the uterus, then curetting is indicated. Packing with gauze may well follow. As regards serum-treatment, sufficient experience is not at hand on which to base a judgment. Byers has had no experience with hysterectomy for this condition. He recognizes fully the value of tonics and food with these patients.

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**Variations in Weight in the Newborn Child, and their Cause.**—In the *Archiv für Gynäkologie*, 1896, Band 52, Heft 2, SCHAEFFER reports his investigations upon this subject in the clinic at Heidelberg. His material was 592 healthy infants in the Heidelberg and Munich clinics, and they were observed on the seventh to fourteenth day after birth, 94 of them being studied daily. It was found that but 14½ per cent. of these children had made good by the seventh day their initial loss in weight, while 41 per cent. had made good the loss or exceeded it by the fourteenth day. 44½ per cent. weighed less two weeks after delivery than when born. The lowest weight was seen upon the third day, and the greatest gain from the tenth to the twelfth. The greatest variation was seen in boys rather than in girls.

Young and slender primiparæ gave birth to the lightest children, showing the least tendency to increase in weight. The same was true of mothers who had worked hard during pregnancy, or had been ill. Well-nourished women between the twentieth and twenty-ninth years of age gave birth to the heaviest children. The character of the mother's recovery from childbirth had little to do with the weight of the child. The development of the father and peculiarities of race affected the weight of the child considerably. A reason for the loss of weight in the first few days was found in the consumption of tissue to maintain the body-warmth. In the first three days, when but little fully formed milk is obtained, the excretion of uric acid is greatest. So soon, however, as milk-diet becomes established the quantity of urea increases in the child's urine. Premature children showed greater variations in weight and temperature and in the excretions. The children of tuberculous and syphilitic mothers failed to gain in weight. Icterus resulted from the consumption of tissue to maintain body-warmth. It was furthered by a lack of water in the organism and was often observed in weak, premature, or sick infants. It was also seen in cases in which the meconium was slow in coming away. Artificially fed children increase far less in weight than do those who nurse.

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**Death in the Puerperal Period, Tympany of the Uterus, and the Presence of Gas in the Blood.**—SCHNELL reports from the clinic at Würzburg (*Monatsheft für Geburtshülfe und Gynäkologie*, 1896, Band 4, Heft 3) the case of a primipara who had a tedious labor under the care of a midwife. When she came under observation it was found that a transverse presentation existed in a simple flat pelvis. It was impossible to make version because of the tetanic condition of the uterus. Accordingly the patient was admitted to hospital, and given morphine and warm applications to the abdomen. Tympany of the uterus gradually developed. A very difficult version was finally made, and an abundance of gas dislodged from the uterus. It was necessary to perform craniotomy on the after-coming head. The amniotic liquid had a foul odor. The child was a large one, and partly macerated. The patient died of shock shortly after. On post-mortem examination the great vessels at the base of the heart contained blood mixed with gas. The same condition was present in the pericardium, in the lungs, spleen, and liver, and to a less extent in the abdominal aorta. It was thought that the presence of the bacillus coli communis was responsible for the decomposition present.

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**The Relationship between Myoma of the Uterus and Sterility.**—HOFMEIER (*Berliner klinische Wochenschrift*, 1896, No. 43) publishes a paper in which he gives the statistics from his hospital and private cases, and is led to conclude that myoma of the uterus does not in itself cause sterility. His analysis of statistics is very minute, and the conclusion seems inevitable. He finds in a number of cases that sterility was present during the first five years after marriage, before a myomatous tumor could be detected. It is only exceptionally that the direct influence of the presence of the tumor in producing sterility can be proved. He reports a number of cases in which the tumor disappeared during the puerperal state without interference.

## PÆDIATRICS.

UNDER THE CHARGE OF

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**Nephritis in Infantile Scurvy.**—THOMAS (*Boston Medical and Surgical Journal*, September 3, 1896, p. 230) calls attention to the frequency with which blood or albumin, or both, has been found in the urine in reported cases of infantile scurvy. He is inclined to think that kidney-trouble of greater or less severity would probably be found in all, or nearly all, of the cases if a microscopic examination were made during the early stages of the disease. In certain cases of Gee, Thompson, Barlow, and Sir William Roberts the kidney-trouble seems to have been the only symptom of the disease.

The author reports a case showing marked disturbance of the kidneys, which, while not the only symptom present, was the first and most marked one. The patient was a girl of healthy parentage, fed from birth upon the bottle. At the age of three weeks she had been overfed by the nurse and began to suffer from digestive disturbances. She was fed upon modified milk until at the age of six months she had an attack of diarrhoea, which yielded after a change in the formula of the milk. After this she failed to gain; each time the food was made more nourishing the digestive trouble returned. Finally malted milk was given in alternate feedings with the modified milk, and the child began to improve. At the age of seven months malted milk alone was given, with half an ounce of cow's milk or cream in each feeding. She continued to gain until eight and one-half months old, when she began to take food badly, was feverish, and passed a smaller quantity of urine than usual, which stained the napkins a dark color. The feverish symptoms subsided in a few days. The urine, now examined for the first time, was distinctly red in color, acid in reaction, of a sp. gr. of 1012, and contained a trace of albumin and much blood. The microscope showed normal and abnormal (shadow) red corpuscles, numerous leucocytes, a few renal cells, and very rarely a hyaline cast. The next day the gums about the four central incisors were swollen and red. The food was now changed to a mixture of milk, cream, and water, unsterilized, with beef-juice and orange-juice. The general condition quickly improved, but it was five weeks before the urine was perfectly normal.

The author therefore feels warranted in concluding that in infantile scurvy the kidneys are probably affected in a large proportion of the cases, at least during the acute stages, and that this catarrhal nephritis is probably caused by the presence of an irritant in the blood, which by its effect upon the walls of the renal vessels produces hemorrhages; that cases occur in



which the renal symptoms are the first, or perhaps the only ones observed; and that in suspected cases the condition of the urine may lead to an early diagnosis and possibly to the prevention of severer symptoms of the disease.

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**Conclusions Concerning Lumbar Puncture.**—WENTWORTH (*Boston Medical and Surgical Journal*, August 6, 1896, p. 139) presents a valuable experimental study of lumbar puncture founded upon twenty-nine cases. His conclusions are quoted as follows:

1. The normal cerebrospinal fluid contains neither cells nor fibrin and is perfectly clear.

2. In cases of meningitis the cerebrospinal fluid is invariably cloudy when withdrawn. The degree of cloudiness is to some extent proportionate to the amount and character of the exudation in the meninges.

3. The cloudiness is caused by cells. The character of the cells differs with the variety of meningitis. After withdrawal more or less fibrin is formed in the fluid. The presence of these cells and fibrin is pathognomonic of inflammation in the meninges.

4. The cloudiness is oftentimes so slight that close observation is necessary to detect it.

5. The operation is not difficult to perform on infants and children. It is not dangerous, if strict cleanliness is observed.

6. The differential diagnosis between the various kinds of meningitis can be made by microscopic examination of the sediment, by cultures taken from the fluid, and by inoculation-experiments.

7. Inoculation-experiments afford the surest means of determining tubercular meningitis. They are of value to distinguish between the varieties of meningitis in order to determine if tubercular meningitis is recovered from.

8. In the normal fluid a faint trace of albumin is usually present, about one-fiftieth of one per cent., or less, by quantitative analysis. In meningitis the amount of albumin is increased, and has varied from one-thirtieth to one-tenth of one per cent.

9. In one case a diagnosis of general infection with the staphylococcus pyogenes aureus was made from cultures taken from the cerebrospinal fluid.

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**The Action of Streptococci upon Diphtheria-cultures.**—By mixing cultures of the streptococcus with those of the Klebs-Loeffler bacillus BONHOFF (*Hygienische Rundschau*, 1896, No. 3, S. 97) has observed a considerable increase in the virulence of the latter. The dose necessary to kill a guinea-pig was much less than that required for a culture of the diphtheria-germ. If the dose was decreased to the point of permitting life for two to three weeks, there was observed, besides emaciation, a diminution in the secretion of urine, which became sanguinolent. The autopsy showed especially profound alterations in the kidneys visible to the naked eye. The glomerules were swollen and projected above the cut surface. The microscope showed the shedding of epithelium from the urinary tubules and the presence in their lumen of numerous altered red globules. These lesions cannot be obtained with pure cultures of the streptococcus, but only by adding to the diphtheria-cultures the toxins of streptococci obtained from cultures four weeks old.

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